THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXV. No. 2131.] LONDON, MARCH 15, 1904. [56TH YEAR. PRICE 6d.

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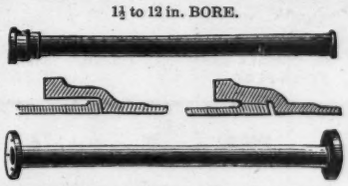

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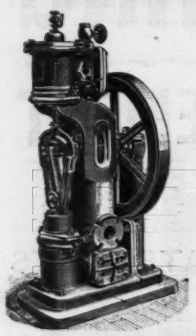

Fig. 705. "SINGLE RAM" STEAM-PUMP.

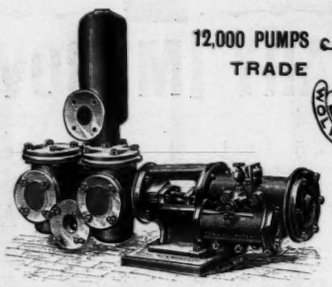

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

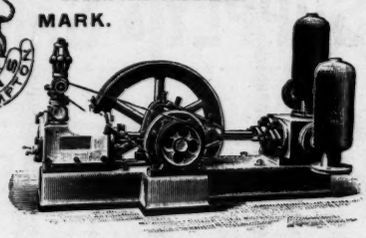

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

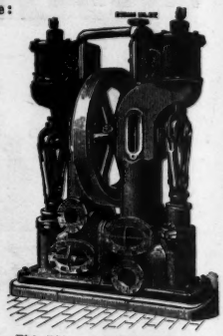

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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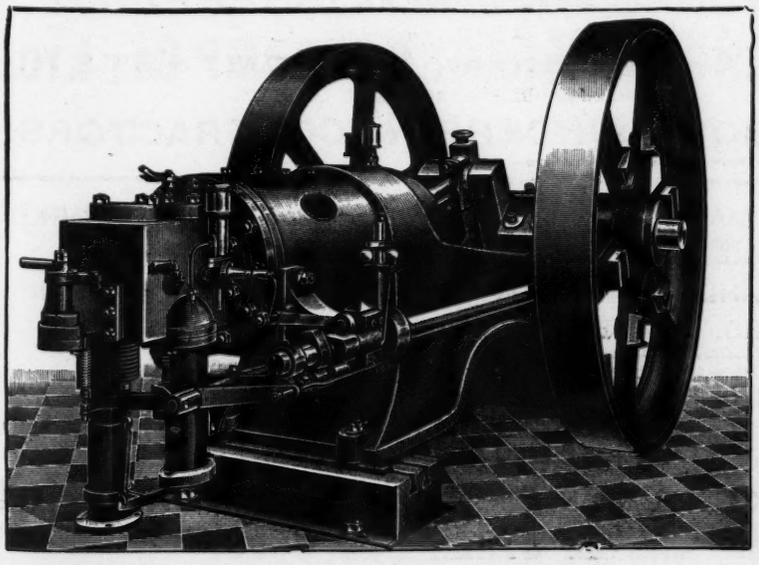

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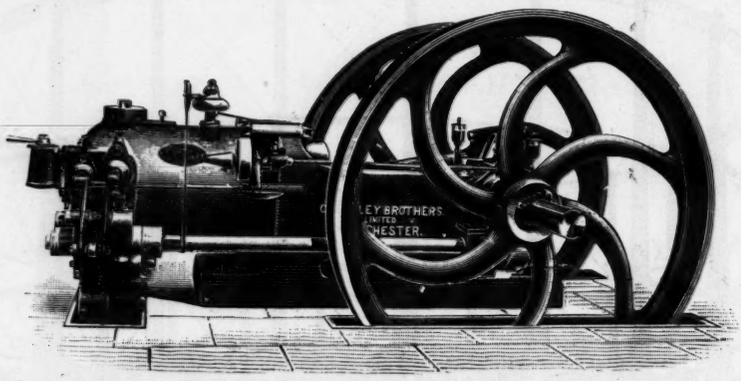

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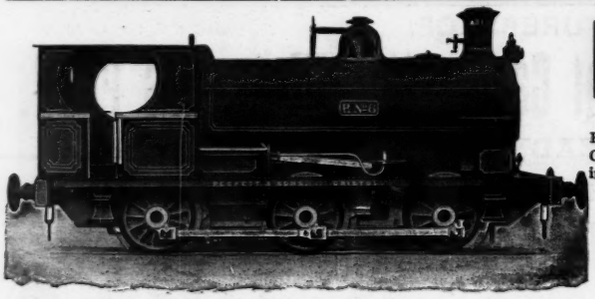

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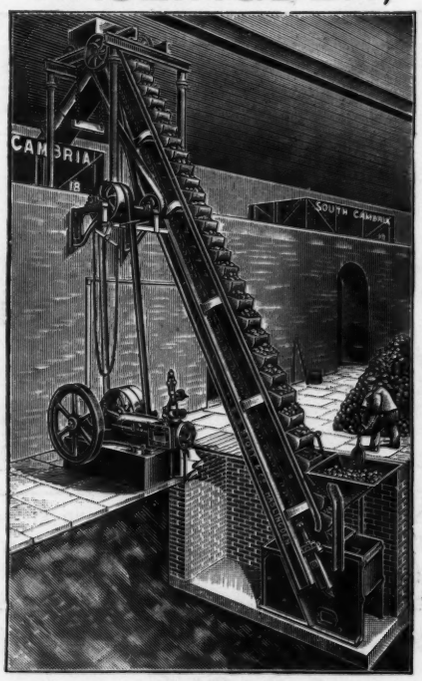

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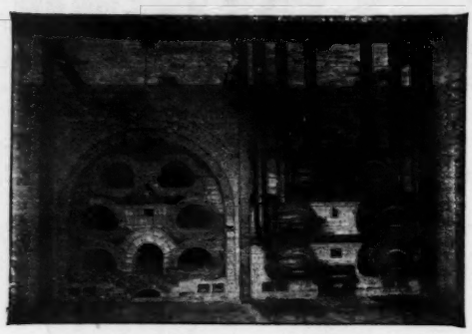

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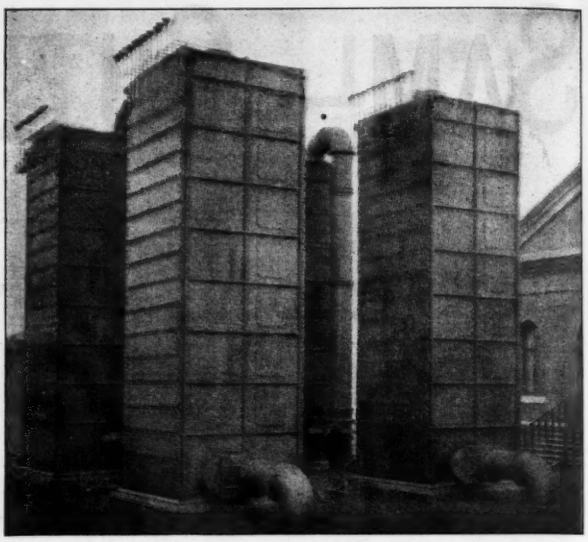

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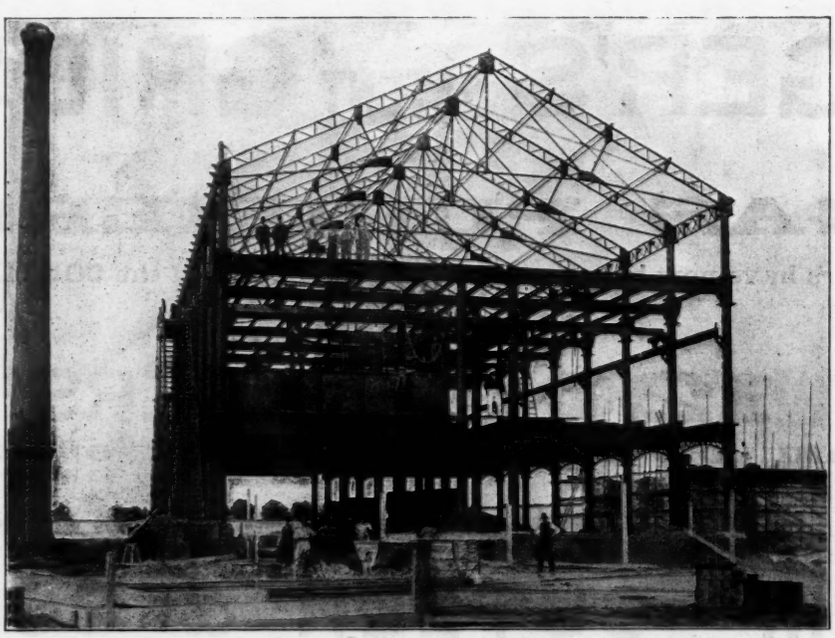

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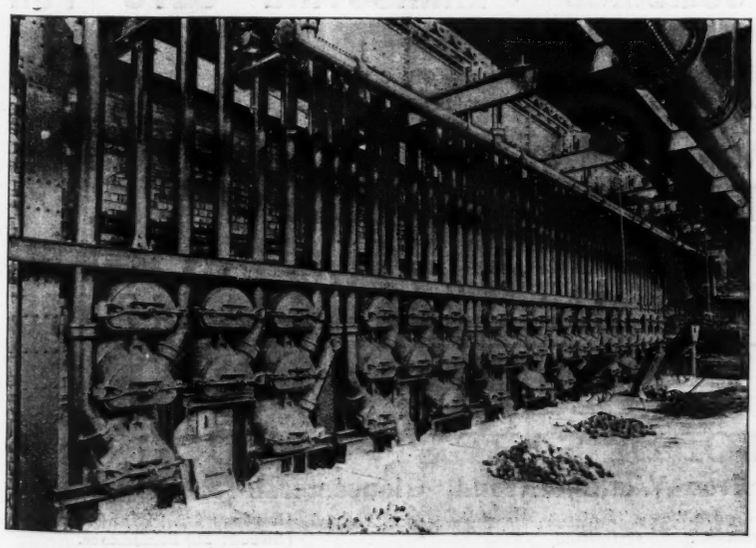

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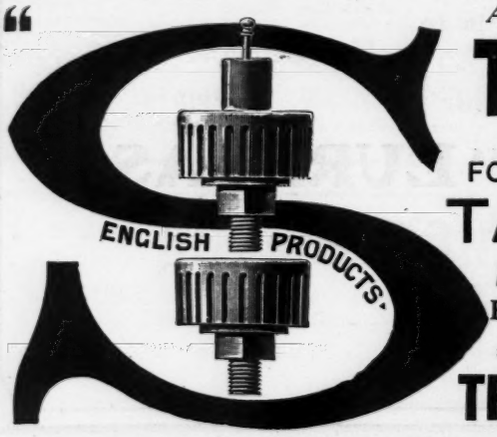

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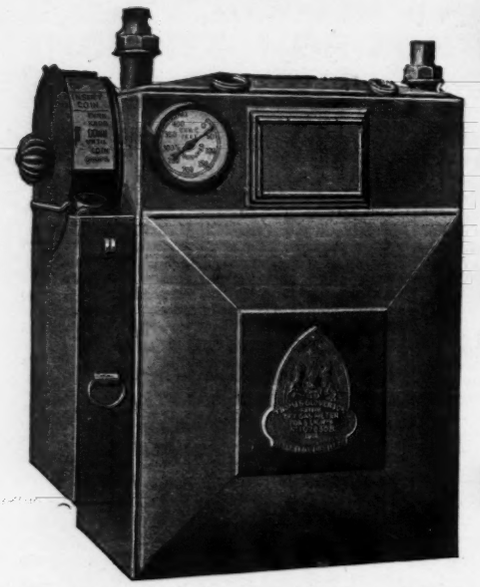

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EDITORIAL NOTES—GAS, &c.

How Gas is Burnt Nowadays.

IT is almost impossible in this country to obtain really trustworthy data as to the extent to which gas is consumed for different purposes and by different burners. Gas undertakings here have no power to obtain a return from consumers as to the number and nature of the burners and appliances which they use, though such information would be an invaluable assistance to the administration of gas-works in determining the character of the gas supply which would best meet the requirements of the majority of its customers. Indeed, it must have struck every thoughtful observer of the proceedings before Parliamentary Committees, when a Gas Company are applying for powers to reduce the statutory "illuminating power" or the degree of "purity" of the gas to be supplied, that no one is able to produce definite evidence as to the proportions in which the gas is consumed for different purposes within the area of supply. It is, therefore, a matter for congratulation that an able Dutch gas engineer, Heer W. Niermeijer, who is the Manager of the Arnhem Gas-Works, has succeeded in preparing—primarily for the enlightenment of his Municipal Council—an exhaustive report regarding the manner in which gas is consumed in his town, and the changes which have occurred therein in the course of three years. His conclusions deserve wide circulation at the present time; and we offer no excuse for drawing the attention of readers of the "JOURNAL" to the abstract translation of his report which appears elsewhere to-day (p. 693).

The most significant features of the report are the rapidly decreasing use of flat-flame burners which it exhibits, and the absence of any inter-relation between the "illuminating "power" of the gas supplied and the quantity consumed. The data collected show that only 16 per cent. of the gas consumed in Arnhem passes through self-luminous burners for lighting purposes; and it is only in respect of this small proportion that the "illuminating power" of the gas is, *per se*, of any moment. The pertinent question is asked whether, for the sake of a small minority of the consumers who persist in using burners of an obsolete type, the best interests of the vast majority of the consumers are to be sacrificed. There is no reason to suppose that the conditions of gas consumption at Arnhem are widely different from those prevailing in most English towns; and hence the question becomes one which gas-works administrations, local authorities, and Parliament should seriously ponder over at the present time. It is a matter in which the minority, which prefers waste and inefficiency rather than depart from traditional ways, must be asked, and, if need be, compelled, to give way for the sake of the majority, which finds economy and efficiency in modern modes of consuming gas.

Sale of Gas and the Metric System Bill.

THE Select Committee of the House of Lords appointed to consider the Weights and Measures (Metric System) Bill, already mentioned in these columns, has now begun to take evidence. It should be remembered that the principal aim of this measure is to repair the omission of previous legislation on the subject to make the use of the metric system compulsory in the United Kingdom by Act of Parliament. According to the draft of the Bill, this change is to take place as from April 5, 1906, or at such later date as may be fixed by Order in Council. The use of the metric system is already legal, but does not make any headway. Consequently, its partisans, represented by Lord Belhaven and Stenton, are prepared to force on the matter, by simply enacting that as from the passing of the Act the existing Imperial standards of weight and measure shall cease to be standards. Every contract and bargain relating to weights and measures must also be in the new notation, or be void and of no effect. It is all very startling; but somehow there is no indication that the threatened public take the proposal at all seriously. With what good reason this calmness is preserved in face of a suggestion the gravity and far-reaching scope of which can scarcely be expressed in words, appears clearly from the evidence which Colonel Sir H. Jekyll, of the Board of Trade, was instructed to submit as from the Department. It was made plain by this official witness, that exceptions would be necessary to allow contracts with persons residing in countries which did not use the metric system to be made in terms of the weights and measures now current in those countries; to exempt from the operation of the Act land in the United Kingdom which had been surveyed in accordance with the present system; to save the mile, so as to prevent the dislocation of all railway rates charged by mileage; and to take power to also exempt certain trades and businesses, such as the sale of intoxicating liquor by retail and also the measurement of gas. After all this, which was ably supported by evidence from Mr. H. J. Chaney, of the Standards Department, a suspicion must have dawned upon the members of the Committee that it was not worth while going on. We remarked on a previous occasion when this subject was under discussion, that we would challenge anybody to express by the metric system a reduction of 1d. per 1000 cubic feet in the price of gas. The difficulty has not been lightened by the introduction during these latter days of the slot meter. How is an increase in the quantity of gas delivered for a penny, from 26 to 28 cubic feet, to be expressed in metric terms? But then, obviously, if there must be all the exemptions as stipulated for by the Board of Trade—to say nothing of such immovables as screw-thread measurements, paper measure, and the whole department of travel by land and sea—the confusion of having some things subject to the metric system and others not, would be intolerable. And, really, Lord Belhaven ought to go to Smithfield and hear the butchers selling meat by the stone. The fires of that historic ground would be required to be lighted again to enforce his unnecessary Act upon the local trade.

The Opinions of Sir Frederick Mappin.

THE veteran Chairman of the Sheffield United Gas Company, Sir Frederick Mappin, is one of the assets of the gas industry of Great Britain. Not only is it his aim to keep the Sheffield gas undertaking well to the front, both financially and technically—which desire he is able to gratify, by the devoted help of an able staff—but he also labours most successfully at making his public thoroughly well informed of the fact. Sir Frederick knows better than to keep his light hidden, being fully persuaded that what the world does not know something about nowadays may as well be non-existent. We had occasion lately to notice the airy and inconsequent remark of a London journalist that the gas now supplied by the Metropolitan Gas Companies is "notoriously bad." One trembles to think what would be the fate of a Sheffield newspaper reporter who should dare to say the same of the product of Sir Frederick Mappin's Company. The cheapest and the best gas supplied by any private gas company in the world, is the character given by the Sheffield Company's Chairman to this staple; and the people are warned not to forget it. Truly, gas of 17·37-candle power, supplied at prices which range from 1s. 8d. down to 1s. 4d. per 1000 cubic feet, with the lower price for engine supplies, is a record of which this great Yorkshire Company may well be proud. The next time Sir Frederick addresses the world at large, through the shareholders of the Sheffield Company, it would be of advantage if he would give figures to prove how this charge works out, for power generated. This time, he was concerned to rub in, for the behoof of railway shareholders, the convincing figures published by the "JOURNAL" as to the economy of gas lighting for railway stations, over electricity generated for the purpose. The idea entertained by Sir Frederick Mappin, that it had been reserved for him to promulgate the true and only cure for that nuisance of the gas manager, naphthalene obstructions in the district, has had to be given up. The

Sheffield Chairman, however, has the satisfaction of reflecting that he gave all the knowledge of the matter he had for the good of the gas industry generally; and those who are still afflicted with this annoyance are not ungrateful for what was done in this regard. Unfortunately, the trouble in question appears to be too deep-seated to yield quickly to any special treatment. Another branch of gas technics touched upon by Sir Frederick Mappin comes home with peculiar force to the "JOURNAL;" being no other than our own suggestions for the improvement of the native fire-clay industry. We owe something to Sir Frederick's personal corroboration of our criticism of the English and German makes of this kind of furnace materials, and trust that his intervention in the matter, in connection with the Sheffield University College Technical Department, will soon be productive of good effects. This really is a pressing question of industrial politics; for it is absurd for anybody to complain of foreign competition with home manufactures if the imported goods are the best in the market.

The Progress of Gas Bills in Parliament.

PROGRESS was made last week with several Gas Bills, in none of which was there any notable principle in dispute. Mr. Fison's Committee followed up their work on the South Shields Bill with the lighter task of considering the Chippenham Gas Company's Bill, which proved to be merely a screen for a purchase scheme. The situation was somewhat peculiar, inasmuch as there is an Act of 1834 in existence conferring upon the Chippenham Corporation powers to light the town either by gas-works of their own or by agreement with a contractor. The Company were the Contractors, and carried on their business without statutory powers. By the present Bill the Company seek to obtain incorporation; and the opportunity was deemed to be a favourable one by the Corporation to buy them up. The Company were not unwilling; but when it came to the question of terms, the parties could not see the transaction in the same light. The Company think they have a non-statutory undertaking to sell; while the Corporation imagine that they can only be required to pay for a "business, property, and interest." Eventually, a form of purchase clause was agreed to which puts upon the Arbitrator the responsibility for determining what incorporealities the purchasers must pay for, having regard to their own statutory position.

The Sutton Gas Company's Bill came before a Committee of which Mr. Cremer is Chairman, being opposed generally by the Sutton Urban District Council. The Company have a share capital of £60,000, and they desired to convert this into 5 per cent. stock, with an addition of £75,000. It is a Company with a maximum price of 5s. 10d. in the home area, and 6s. 4d. in Banstead. The promoters applied for the sliding-scale, with initial prices of 3s. 6d. for Sutton and 4s. for Banstead. The net selling price of gas at present in Sutton is 2s. 10d. per 1000 cubic feet. The Committee passed the preamble of the Bill, and fixed the additional capital at £60,000, with one-third loan; the auction clauses being applied also to the borrowed money. The standard price was put at 3s. 2d. in Sutton and 6d. more for Banstead; and a renewal fund of 5 per cent. was allowed. No increase of borrowing powers was granted as regards the converted capital. The Company have a good record; and it must be considered that they fared well at the hands of the Committee.

The Bishop's Stortford Company's Bill was dealt with by a Committee of experience in gas matters, presided over by Mr. Tennant. It is an incorporating Bill, and the preamble was admitted after a purchase clause had been added by agreement. The Company date from 1834; and their financial history exhibits the usual features. After the opening speech of Counsel for the promoters, the parties conferred as to the terms of a purchase clause, the possibility of which had been before them since 1898. Thus a bargain which might have hung in the wind for years to come was struck, as is not unusual, under the pressure of parliamentary action on the part of the Company. The Arbitrator is to allow an addition of 2½ per cent. to the purchase price for the cost of re-investment; the fact of incorporation not being admitted as an element of value. The sliding-scale was accepted, with 4s. in Bishop's Stortford and 5s. outside as the standard prices. The District Council are to promote a Bill in the next session of Parliament so as to enable them to carry out the scheme.

The Judgments in Bostock's Case, and in the Miners' "Stop-Day" Case.

Two noteworthy legal judgments were pronounced last week, which deserve the careful consideration of all business men and employers of labour. One was the decision (as to the damages) of Mr. Justice Bruce, in the celebrated arsenical sulphuric acid lawsuit of Messrs. Bostock and Co. against Messrs. Nicholson and Sons, in which the merits had already been disposed of. The Court had found that there was a sale of goods by description within the meaning of the Sale of Goods Act, 1893—that is to say, of sulphuric acid commercially pure. It was, therefore, an implied condition that the acid sold should be commercially free from arsenic. There was, however, no stipulation of this; and the purchasers had not taken steps to satisfy themselves that the article supplied was suitable for their purposes. In the event, it proved to be most disastrous, and resulted in the ruin of the purchasers' business, for which they sought to make the sellers answerable. Against this contention it was pleaded that the sellers were only liable for the actual difference, if any, between the ordinary commercial value of the goods sold and what was supposed to be delivered, assuming a warranty. The disparity was therefore enormous in money equivalent. The lay mind may be assisted to grasp the legal issue if it is put as lying between the direct and the consequential damage. The latter, even laymen know, is not in general recoverable by process. In the present instance, the Judge held in conformity with the general rule. He found that the purchasers were entitled to recover the whole price paid for the impure acid, because where there is breach of warranty, the buyer is entitled to get the whole of his money back. The breach of warranty extinguishes the value, and therefore the price. Secondly, the plaintiffs were given the entire value of the goods they spoilt by inadvertently using the poisonous acid in the manufacture of them. This was held to be a loss directly and naturally resulting, in the ordinary course of events, from the breach of warranty. The claim for the loss of trade was disallowed, because the cause of this mischief was something done by the plaintiffs in the course of their business—namely, the use of a poisonous acid. Further, the plaintiffs were not entitled to recover against the defendants the sums which their customers were entitled to recover from them. This is quite clear. No liability to a distinct third person is incurred in an ordinary case, where there is no communication to the original defaulter; though the non-performance of the contract with a third party may, in a sense, have resulted from the original wrongful act or breach. The second judgment was that of Mr. Justice Bigham in the miners' "stop-day" case, which was also a matter of damages. Dealing with the question of fact just as a jury would have done—that is to say, without giving any reasons, the Judge held the South Wales Miners' Federation liable to pay the plaintiffs, the Colliery Company, £530 in respect of the one colliery taken as the test case. This was as against £735 claimed; and there were eleven other pits to be similarly treated for the one Company, with 78 other Companies in the background. The decision will probably do much to stop the wilful breaking of contracts of labour which has given so much trouble in the trade.

Assessment and Rating of Ground Values.

NOT to be outdone by the Upper House in elegant trifling, the House of Commons last Friday gave a second reading to that familiar parliamentary annual, the Bill for the Taxation of Ground Values in aid of local revenues. It must be admitted, however, that the measure which commended itself to legislators on the present occasion is not quite the same as that which experienced mixed receptions in the past. There are alterations of detail; but whether or not these are of the nature of improvements, it would be hazardous to pronounce oft-hand. The idea underlying the measure remains unchanged—it is still a device for getting at the landowner through the occupier; and it is more than suspected of being chargeable with evil designs upon open spaces in town districts. It is now proposed to tax unoccupied land to the extent of the full current rate on its real value (the annual value being taken as the basis), and then capitalized at 3 per cent. To the objection that the Bill would lead to the overcrowding of land with buildings, thus

destroying all garden ground in town suburbs, the only reply seems to have been a suggestion that "municipalities should "deal with the development of their towns." So one innovation would lead to another. It was asserted in the course of the debate that the Bill has the support of all the largest municipalities in England. This is not to be wondered at, since it promises to bring more money into the municipal treasuries without putting a heavier burden on the present ratepayers. Notwithstanding all that one hears about the relief of rates by the profits of municipal trading, it appears to be the municipal corporations who trade the most who are most anxious for increased assessments. The remarkable feature of the movement in favour of rating the ground landlord is that it is chiefly supported by politicians of the order of opinion which holds that all taxation comes in the end upon the consumer. Yet in this particular instance it is pretended that the tax on ground values would stick to the landlord, and never get down to the occupier. We doubt it. Mr. Remnant, the member for Finsbury, described this assumption as the root fallacy which underlies the Bill. The main objection to the measure, however, is that it is a quack nostrum for a particular symptom of a widespread weakness of the local government system, which must be dealt with, if at all, by a thorough reform of the whole existing system of local taxation. It is not a negligible consideration, that if such a Bill as this were to become law, gas lands would have to be reassessed and rated on altogether novel bases of valuation. Unless we are greatly mistaken, it would probably be found that gas companies would be required to pay rates on a hypothetical improved ground value; while municipalities owning land put to the same use would claim to be let off for the "prairie," or marsh, value of the site, if even they did not argue that operating gas-works is a depreciatory use of any land. It is to be hoped that Parliament will at no very distant date be called upon to revise the whole system of local taxation; and when this is in hand, the opinions of local authorities will be duly regarded. But the proposition to make them sole judges in a cause to which they are party, is one that is not to be seriously entertained, now that so many of them mix up government with commerce.

North British Association and Affiliation.

The Committee of the North British Association have determined not to join in the scheme of affiliation with the Institution of Gas Engineers. The decision was communicated by Mr. Robt. S. Carlow, the Secretary, in a letter addressed to his official *confrère* of the Institution (Mr. Walter T. Dunn) on the 3rd inst. The following is a copy of the letter:—

> At a meeting of the Council of this Association held in Glasgow yesterday, I submitted yours of the 18th of November last to that meeting, when it was unanimously resolved that this Association do not affiliate with the Institution of Gas Engineers.

The letter is as concise and definite as the verdict of a Parliamentary Committee, and analogous likewise in the entire absence of any reason for the decision. It will be observed that, whatever the arguments which weighed with the Committee of the Association, their conclusion was unanimous; and therefore it must be regarded with respect. One fully recognizes that there is in one way a dissimilarity between the North British Association and other District Associations; but at the same time, if all the latter consent to affiliation, it will be a great pity for Scotland not to be represented on the Council of the Institution by the President of its principal gas organization. Perhaps some explanation as to the grounds of the present apparently uncompromising decision will be forthcoming at the annual meeting of the Association in July. There is no great necessity for hurry over this matter. If some delay will secure complete agreement, better by all means have the delay.

Companies and Votes.

The chairmen and officials of companies have so constantly to deplore the ever-increasing item of rates and taxes, that their complaints have come to be regarded as almost a matter of course; and only the happy possessors of an unusually sanguine temperament entertain even a faint hope of any substantial relief in the future. But though it may be necessary for companies to go on contributing these vast sums, there is no reason why they should be made to do so under the existing conditions, which render them altogether powerless to influence or regulate the raising and expenditure of money by the municipalities within whose jurisdiction their works, &c., happen to be situate. This is a question in which gas companies are deeply interested, seeing that they are always among the largest ratepayers in their own particular towns; and therefore our readers will be glad to learn that Sir Albert Rollit has some hope of passing this year the Bill dealing with the matter which he introduced last session, but which could not then be taken owing to want of time. The object of the measure, it may be remarked, is to extend the franchise in municipal and other local elections to corporations and limited liability and other public companies; the voting power being confined to one vote per corporation or company. It is difficult to find a substantial reason for opposing such a Bill, for it will only extend to companies the same privilege as is now enjoyed by even the meanest individual ratepayer—that is to say, some voice in the disposal of the money which they are called upon to contribute. In addition to formally supporting the principle of this measure, the Association of Chambers of Commerce have just decided to make representations to the proper Government Department, setting forth the injustice of the existing municipal electoral regulations with regard to companies, and earnestly requesting that steps be speedily taken to remove it. Under these circumstances, it should not be too much to hope that gas companies will shortly have at any rate one just cause of complaint taken away from them.

Dividends and Income-Tax.

The judgment delivered by Mr. Justice Buckley a few weeks ago in the case of *The Attorney-General v. The Ashton Gas Company*, has proved to be of importance to at least one other Company besides the defendants in that action. It will be remembered the point was whether maximum dividends could legally be paid free of income-tax; and it was decided that the "profits divisible in any year among the shareholders of the Company ought to be calculated as inclusive, and not exclusive, of the amount payable for that year in respect of income-tax on the profits proposed to be divided." It transpires that the shareholders in the Sheffield United Gaslight Company also have hitherto been accustomed to receive their full 10 per cent. dividend, free of income-tax; but in the warrants sent out last week this amount was deducted, and it was intimated that the same thing would be done on all future occasions. Of course, no Board, being aware of the Ashton decision, would act in a different way from what the Sheffield Directors have done. There may, however, still be a Company or two paying maximum dividends tax free, who have not heard of Mr. Justice Buckley's judgment; if so, perhaps this further reference to the matter may be the means of bringing them into line.

Municipal Affairs at Stockport.

Brief reference was made last week to the extraordinary state of affairs which has arisen at Stockport, in connection with the affairs of the Corporation Cleansing Committee. Public attention was first drawn to the matter early in 1903, when the then Superintendent of the Department (Mr. R. O. Hammond) recovered damages in an action for libel against the Elective Auditor, Mr. T. Hunt, in connection with statements he had made regarding alleged irregularities. This was followed in the autumn by a local inquiry into the whole matter by a Commissioner (appointed for the purpose by the Corporation), who said that, in his opinion, serious irregularities had been conclusively proved. Before the Commissioner's report was received, but in consequence of what came to light during the inquiry, an action was brought by the Corporation against a carrier to recover a sum of money said to be due for two old carts purchased by him from them; and defendant in this case successfully pleaded that he had paid the money to Mr. Hammond, who was consequently arrested on a charge of misappropriation, and committed for trial on this as well as on another charge preferred by Mr. Hunt. The trial on the first charge took place at the Cheshire Assizes last Friday, when the defence was an absolute denial that the amount in question (£7) had been paid to Mr. Hammond by the carrier in question; and in the result, the Jury brought in a verdict of "Not guilty." In consequence of this, Mr. Hunt offered no evidence regarding the charge he had preferred against Mr. Hammond, and therefore a similar verdict was entered in this

case also—Mr. Justice Phillimore deciding to allow Mr. Hunt his costs, "to mark his sense of the way in which he had discharged his public duty." We congratulate Mr. Hammond on having thus satisfactorily cleared himself of the serious charges that were brought against him. In view of the results of the local inquiry and the various trials referred to, the Stockport Corporation must find it a little difficult to determine just how they stand; but it is to be hoped they will in future so order their affairs that a repetition of such trouble as they are now going through will be rendered absolutely impossible.

An Electrolysis Clause Success.

So far little has been heard in the present session of Parliament of the question of electrolysis; but yesterday afternoon there was a success that deserves prominent chronicling. The Dolter Electric Traction, Limited, are the promoters of a Bill for the laying down of tramways in Torquay. Their system is a surface-contact one; and we believe that the only existing example is to be found on one of the tramway routes in Paris. Before the Company could get sanction to the promotion of the Bill, they had to concede to the Torquay Corporation a protective clause for their water-mains, and also for the gas-mains in a small portion of the area under their jurisdiction which they themselves light with gas. The promoters, however, would not concede the same clause to the Torquay Gas Company, who, of course, supply the major part of the borough. The Gas Company consequently prayed Parliament for protective rights for their pipes equally with the Corporation; and they supported their petition before the Committee who were considering the Bill yesterday. After the adjournment for lunch, the Committee announced—much to the satisfaction of the Gas Company, and without troubling them for their evidence—that they had come to the conclusion that the protection the promoters had given to the Corporation should also be accorded the Gas Company. Professor Ayrton, Mr. J. G. Newbigging, and Mr. R. Beynon, the Engineer of the Torquay Gas Company, were present to give evidence. As the Gas Engineer to the Manchester Corporation, who own the electric, gas, tram, and water services, Mr. Newbigging's evidence would, we believe, have been very valuable. He had with him some tangible testimony in the way of affected pipes from the city streets. However, this insertion of an electrolysis clause without an actual fight, and the granting by the promoters of protection to the Corporation, are both important recognitions of the rights of gas and water suppliers in connection with their distribution systems.

The Royal Commission on Coal.—According to "The Times," it is expected that the inquiry being conducted by the Royal Commission on Coal Supplies, under the presidency of Lord Allerton, will conclude before the end of the financial year 1904-5. Since their appointment in December, 1901, the Commissioners have been taking evidence, and conducting local inquiries in seven separate districts of England.

Marshall's "Standard" Purifier Grids.—We are promised for next week by Mr. F. D. Marshall, the patentee of the "Standard" grids for purifiers, a full description, accompanied by diagrams, of these new grids, showing their action and advantages. That the grids are appreciated is apparent from the number which we learn are already in use, within one year, on the Continent. Mr. Marshall has had made a very ingenious model, representing a full-sized section of a purifier fitted with a glass face, by which the peculiar action of the grids is demonstrated; and he will be pleased to show this model to anyone interested. Messrs. Kirkham, Hulett, and Chandler, Limited, have been appointed makers of the grids.

The De Brouwer Patent Coal-Projector.—Owing to the continued success of the "D.B." patent coal-projector at the Derby, Bury, and other gas-works, the Directors of the Reading Gas Company have decided to place an order with Messrs. W. J. Jenkins and Co., Limited, of Retford, for an installation of this plant. The projectors will be suspended from overhead rails, and will be fed by continuous hoppers. The firm have also received orders for a large installation from the Salford Corporation for their Liverpool Street works. In this case, the projector will travel on rails let in the stage-floor, and will contain an overhead hopper of 5 tons capacity, which will be filled by six fixed hoppers erected at intervals down the retort-house. A discharging-machine will also be employed to push the coke out of the 20-feet retorts, so that the coke can be dealt with on one side of the retort-stack only. An order has also been received from the Otley Gas Company for a similar plant to that at Derby.

WATER AFFAIRS.

A Proposed Ministry of Health.

THE question of establishing a new Government Department to take charge of all matters relating to the public health has been brought forward on various occasions at meetings of the societies whose special function it is to deal with sanitation; and, so far as we are aware, it has invariably been received with approval. It has been thought for some time that certain of the duties now discharged by the Local Government Board might with advantage be entrusted to a new department; and at present there are strong indications of a movement in the direction of having one constituted. Last Tuesday, a representative meeting of Members of Parliament belonging to the medical profession was held, at which a Committee was formed, with Dr. Farquharson as Chairman, to watch in the House of Commons all projects of legislation likely to affect the public health. The view of the Committee is that there should be a Ministry of Health, at least one member of which should be a medical man of high qualifications; and it may be presumed that they would entrust it with much the same duties as those which have been discharged for about a quarter of a century by the State Board of Health of Massachusetts. There is no more potent factor in the production of a healthy people than a good water supply; and though the Metropolis is not badly off in this respect, there are many places in the Provinces which might derive great advantage from the existence of such a body as the one contemplated. For instance, as in the case of the Massachusetts Board, their advice might be sought as to how to provide a supply, or to improve one found to be inadequate or unsuitable. According to the latest report, assistance of this kind was rendered by the Board in nearly a hundred cases; the information furnished including sets of rules and regulations for the sanitary protection of sources of water. The definition of watershed areas and the examination of water would be matters that might be undertaken by the proposed Ministry of Health; and there is no reason why a laboratory on the lines of the Lawrence experiment station should not be as useful to the country at large as that establishment is to one State. When it is borne in mind that in that comparatively limited area there are about 250 sources of public water supply, and that nearly the whole of them were examined at least once in the twelve months covered by the report, some idea will be formed of the extent of this branch only of the work carried on. The suggestion that there should be a medical man upon the new body is justified by the example of the Massachusetts Board, three of the seven members of which are doctors, while another is a civil engineer. They are assisted by an Engineer, a Pathologist, an Analyst, a Chemist, and a Consulting Chemist; and the record of their combined labours forms a goodly volume. Such an organization as this might, it seems to us, be taken as the basis of a State Department similar to that contemplated by the Committee already alluded to; and there is a growing feeling that its constitution would be a distinct advantage to the public.

Storage and Utilization of Flood Water.

THE few days of bright sunshine which have lately followed a short period of comparatively dry weather have had the effect of removing the dreary waste of waters which presented itself to the eye of a visitor to Windsor Castle standing upon the Terrace and looking up the Thames and in the direction of Eton College. The heavy floods of the early part of the year had overspread the valley of the river, to the great inconvenience and danger of the dwellers upon its banks, and the injury of land and property. Now that the waters have subsided, and the stream has assumed something like its normal flow, it is difficult to repress a certain feeling of regret that some of the superabundant water could not have been secured for use in times when the skies were not so bountiful as for some months they had been. We have always agreed with those who have maintained that the watershed of the Thames is capable of providing all the water the population of London will require for many years to come, and that all that is needed is adequate storage for it. Probably no one has studied this matter more thoroughly than Professor Henry Robinson; and he rendered a service

to his professional brethren by once more directing their attention to it in the paper he read at the meeting of the British Association of Water-Works Engineers last December. He, however, dealt with a larger area than the Thames Valley. The proper utilization of the rainfall of the country is a subject, as he pointed out, which concerns the nation at large; and it deserves more comprehensive treatment than it has hitherto received. But pending the formulation of a project of such wide application, it would be advantageous to give some further attention to the Thames. Professor Robinson has already examined the valleys of several of the tributaries of the river with a view to the construction of impounding reservoirs; and he states that from more than one gathering-ground which he has investigated in detail flood waters could be conserved at small cost, and utilized to meet the future requirements of the Metropolis, or to increase the volume of water in the river during periods of dry weather.

The Engineers of the London Water Companies drawing their supplies from the Thames recognized the special suitability of the valley of the river for the construction of reservoirs; and these have become so numerous that it has been said to be difficult to land from a boat between Thames Ditton and Staines without stepping into one or on to a racecourse. Within the past six years, the two great artificial lakes forming the first instalment of the scheme of the Staines Reservoirs Joint Committee have been completed, and are ready, when certain auxiliary works have been finished, to send into London an additional 35 million gallons of water daily. On the other side of the river, the Southwark and Vauxhall Company are increasing their storage works to the extent of 1000 million gallons. The reservoir commenced three years ago will be completed by another body than that which initiated it; but it will none the less be a permanent monument to the Company's prevision. These are valuable additions to the works upon which London depends for its water supply; and there seems to be no reason why others should not be provided, instead of going—as has been proposed—to a distant part of the country for what we have in abundance at our doors.

To go no higher up the river than Staines, it was shown to the Royal Commission presided over by Lord Balfour of Burleigh that by the scheme devised by the late Mr. Fraser and Mr. Walter Hunter a series of seven reservoirs could be constructed in close proximity to the river, which would provide storage for 17,526 million gallons of water—a quantity which will probably not be needed for the next forty years. The great merit of this scheme is that the sites selected could be acquired, and the work proceeded with, as the demand for water increased. The land in the locality indicated is peculiarly well suited for the construction of reservoirs; and its utilization in this way seems to present a practical solution of what has for some years been a troublesome problem. The initiation of a comprehensive scheme for the storage and utilization of flood water in the neighbourhood of the Metropolis would probably lead to the adoption of similar measures in the Provinces. At all events, it would direct further attention to the subject.

The Westinghouse Company's Works.—An illustrated article has been prepared in connection with the visit of the Manchester Institution of Gas Engineers to the works of the Westinghouse Company at Trafford Park. Its publication has, however, been unavoidably postponed for a week.

Proposed Gas Congress at St. Louis.—Mr. C. J. Russell Humphreys, the Chairman of the Gas Congress Committee of the American Gaslight Association, is inviting other Gas Associations to assist in the preliminaries for, and join in the deliberations at, a gas congress to be held at St. Louis on the 15th, 16th, and 17th of June, by which date it is thought the Exhibition will be at its most interesting stage. This is the first attempt which has been made to hold a congress of all the Gas Associations of America, of which there are eleven, with a membership of about 2000; and it is confidently thought that if these bodies would join with the American Association, a pleasurable and profitable gathering, and one which could not but redound to the advantage of those who are pecuniarily interested in the gas industry, would be the result. The nucleus of a good attendance is assured by the fact that the Western Gas Association have arranged to hold their annual meeting on the 14th of June—the day before the opening of the congress—to confine their business to one day, and then to adjourn to meet their colleagues. It is intended to invite gas engineers from abroad to participate in the congress; and further particulars are promised of what is proposed.

SOME POINTS OF THE COMPETITION BETWEEN GAS AND ELECTRIC LIGHT.

THERE is no relaxation of effort in the long rivalry of electric light with gas; and week by week the incessant conflict wags to and fro, as one or the other competitor for public favour gains ground in one place, only to be driven back elsewhere. Although, generally speaking, the electric light is losing ground before incandescent gas, in the public streets and in the interior lighting of large works and railway stations, yet fresh installations of it are continually being organized, and gas companies are as constantly being called upon to defend their position. Too much importance, in these circumstances, cannot be attached to the actual testing of street lighting effects by portable photometry, because the inveterate electricians' trick of magnifying the illuminating power of electric lamps of every description is only to be exposed in this way. The only safe rule is to never take the luminous intensity of an electric light for what it is reputed to be. The imposture of "French measurement," by which electric arc lamps were rated as of 2000-candle power, is anything but completely dispelled. In a milder form it reappears in the Nernst lamps, which often do not yield one-half of the candle power on which they are sold. It is worth while to take particular notice, in this connection, of a recent admission by the writer on electrical supply in the "Municipal Journal," who makes no bones about the confession that it is a "serious problem" to find a satisfactory electrical substitute for the incandescent gas mantle for street lighting. Seeing how few years have passed since the incandescent gaslight was first made practicable for this particular use, the admission is distinctly comforting.

This writer is obliged to own, in fact, that the past five years have witnessed great changes in the street lighting problem, to the disadvantage of electricity. The glamour that once attracted lighting authorities to electric lighting has passed away; "and the only two aspects of the question to-day are the cost of the lighting and the illumination given." As to this, it is further admitted to be "axiomatic that if electricity is worsted on both these heads, gas will do more than hold its own." Stripped, therefore, of every adventitious consideration, this is how the rivalry of the two systems strikes our candid competitor. "Suppose gas costs 3s. per 1000 cubic feet, and electricity 2d. per unit. When the flat-flame gas-burner is used, it is probably correct to take 4 to 5 cubic feet per hour as equivalent to 16-candle power. The burning hours in a year are, roughly, 4000. On this basis, gas would cost £2 18s. In practice, it is not far out to take 60 watts for 16-candle power, which in round figures gives 240 units per lamp per annum, at a cost of £2. With flat-flame burners, electricity shows a saving with equivalent light. The incandescent gas mantle, taking 2½ cubic feet per hour, must be admitted to give something much higher than 16-candle power as an average throughout its life, though the claims made of 32, 40, and 50 candles, and even higher illuminations, cannot be supported. It is with this that the electrical engineer has to compete, and the cost of gas may be set down at 30s. to 35s. per post per annum." This, having regard to its origin, is not an unfair statement of the case. The writer goes on to say that one of the latest results of the practical issue of such a comparison is from Walthamstow, where the annual cost of a pair of 16-candle incandescent electric lamps works out at £5 16s. per annum, which is about twice as much as most gas companies receive for equal incandescent mantle lighting. The critic concludes that electricity in this form is out of the running.

This comparative statement is repeated here, because of its clearness and simplicity. Also, of course, on account of the candour of the conclusion. As a matter of sober fact, it is a long way from acknowledging the worst of the electric light case. To begin with, it will strike everyone at the first glance that gas at 3s. per 1000 cubic feet means a profit price; whereas electricity at 2d. per unit is not even cost price to any municipal undertaking. Leaving all question of profit out of the estimate, the electricity ought to be charged at the very least 3d. to 4d. per unit. This correction immediately changes the balance of economy, even for flat-flame burners. At the familiar equivalents of gas at shillings per 1000 cubic feet and electricity in pence per unit, the equilibrium is fairly established—that is to say, in the case of flat-flame burners the cost of the street-lamps at 3s. per 1000 cubic feet for the gas would be about the same as that of incandescent electric lamps at 3d. per unit. But the incandescent mantle makes the comparison appear very different. It is nonsensical to pretend that illuminating powers of 50 candles and upwards cannot be had with Kern burners consuming gas at the rate named, or with any ordinary incandescent burner consuming 3½ cubic feet of gas per hour. A portable photometer will prove the fact any night. The efficiencies of these two types of incandescent burner are 25 candles and 20 candles per cubic foot of hourly consumption; and those electricians who shut their eyes to this truth are going to lose their street lighting trade.

They look for help to "arcettes," Nernst lamps, and in the dim and distant future to Volckmar, Cooper-Hewitt, and other not particularly novel inventions. By the first-named, it is to be understood that the small, enclosed arc lamps are meant. These have been a long time coming; and not many of them are to be seen in the exposed situation of a street lamp. With regard to Nernst

lamps, it is pretty well known that their average efficiency is not much more than 50 per cent. of their rated figure. The other kinds of electric lamps are not in the market. We have hitherto said nothing of the various high-power gas-lamps that are actually in service, and conspiring to make the prospects of any possible electric lighting system well-nigh hopeless. On the whole, therefore, so far as street lighting and the lighting of large open or enclosed spaces is concerned, the vogue of electricity may be regarded as past. Gas, originally attacked in these applications by the rival light, has recovered its ground.

It is not to be pretended that the same remark applies to interior lighting. It would be ridiculous to suggest anything of the kind, in view of the growth of private electric lighting. When brilliancy of effect and saving on the lighting bills are the chief considerations, incandescent gas has nothing to fear from electricity. But these are not the chief considerations everywhere. It would be as absurd for gas engineers to shut their eyes to the facts of the private lighting business, as it is for electricians to affect to misunderstand the signs of the times regarding the branches of the trade already discussed. Let us, on the contrary, face the truth. A shopkeeper writes to his trade journal saying that, having changed over to electric lighting for his shop for the last two or three years, he would not go back to gas at any price. "The light can be put anywhere in your windows, and distributed as you like to show off the different goods displayed. When I used gas I constantly had to have my ceiling recoloured; and the fumes used to turn the colour of brass goods, and cause them to perish. The immunity from fire and the general comfort all round from electric light make one feel surprised that there is any question on the subject." This is a good specimen of the kind of advocacy which gas managers must be prepared to meet.

By a coincidence, in another part of the same trade journal which gives publicity to the above whole-souled commendation of electric lighting for a shop, there appears an "Electrical Inquiry" relating to the testing of an electric light installation of six years' standing. The insulation resistance was found to be very low on some circuits—30,000 ohms and even less. It is suggested that the low reading might possibly be due to damp, or bad work, or inferior wire; but the inquirer had not found the cause. He wished to know whether the low reading would affect the electric lighting current, and in what sense, at the meter. The reply was that as the number of lamps per circuit was not stated, there was no datum for ascertaining how much more the insulation resistance was than it ought to be. This remark, however, was added: "The evil to be feared in a case like this is not chiefly leakage of extra current through the meter, though this might become appreciable in a very bad case. The chief trouble is likely to be reduced pressure at the lamps, if the leakage is between the poles, and there is a certain risk of ultimate short-circuit or fire." So much for the other gentleman's confidence in the "immunity from fire" of any electric light installation. Gas managers everywhere are at the moment being challenged to hold their ground in the lighting of churches, which, with few exceptions, are abominably ventilated, and in regard to which their rivals the electricians are offering to do all the interior wiring and provide simple lamp pendants at a price which does not exceed £1 per lamp. It is very doubtful whether sound work can be done for the money; but, in any case, the additional risk of fire should be brought to the notice of those concerned. A certificate that the electric lighting will not affect the insurance ought to be insisted upon. Church lighting probably pays a central electricity supply undertaking very well, especially as it comes in at the top price under the maximum demand system.

Another matter to which gas managers must give more attention than there has hitherto been any necessity for doing, is the piping of new houses. How ridiculously fossilized and unbusinesslike some gas companies still are, notwithstanding the competition at their doors, recent proof has been given in the "JOURNAL." They have now to give heed to the all-important circumstance that speculative builders find the announcement "wired for electric light" a greater attraction for possible tenants of eligible residences fitted with every modern improvement, than the accustomed legend "gas laid on." People are swayed by circumstances in a notable manner; and where houses are wired for the electric light they will use it, though it costs them more than the familiar gas. Besides, where a new building is once finished off without gas-piping, there is little likelihood indeed of this being put in afterwards. It may be possible to make gas cooking-stoves and gas-fires compensate for the loss of the lighting connection; but it is quite certain that nothing of the kind can be hoped for without effort of a businesslike character. If this means a small addition to the costs of carrying on the business, the necessity must be faced. Gas directors hitherto have had no experience of administration upon competitive lines. The "on-cost" charges of gas supply have been very small, in relation to the turnover. Directors who are acquainted with other branches of business would be well advised to look at gas supply in the light of this experience, and adjust their policy to the needs of the times.

It behoves gas managers, among other things, to be ready to meet the plausible asseverations of their rivals in the lighting trade, that ventilation is unnecessary, and dirt not to be thought about, where electric light is used. There is plenty of experience available to prove the "stuffiness" of crowded interiors lit by incandescent electric lamps, the presence of which does not render the re-breathing of respired air more heathful or refreshing. With regard to the dirt caused by gas on walls and ceilings, the illustration of hot-water pipes and their effects in this kind, where the air is dusty to begin with, should suffice to put a different complexion on this superstition. A fog in a smoky town will soon tarnish bright brass and silver ware, irrespective of the means of artificial lighting employed. In pure air, of course, the effect of any means of lighting is indifferent. Gas-lit rooms in country places do not get dirty. It has not been shown that the trade of the house decorator in London has suffered materially from the fashion of electric lighting. Certainly, if there is anything in the science of bacteriology, medical opinion will not be found on the side of those who pretend that the ventilation and periodical cleansing of places occupied by people for purposes of work, play, or merely living, can safely be neglected. On the other hand, the omnipresent microbe is more likely to get himself burnt up, or otherwise neutralized, by a living flame than by a glass bulb which is scarcely hot enough to do more than sterilize its own surface.

MR. BAKER'S CRITICISMS OF THE PREPAYMENT METER CLAUSE.

THE communication last week from Mr. C. E. Baker on what has become to be known as the "Prepayment Meter Clause," and which it has been suggested shall be inserted in all Gas Bills in future, is remarkable for more than one thing, but it will be recognized as such principally because Mr. Baker is a lawyer here putting forward unrequested an opposition case on behalf of two parties—gas suppliers and consumers—who really, in this particular instance, have little need of his admittedly well-intentioned and voluntary offices. The communication comprises several points. Those with which it is possible to agree are few; those with which it is possible to disagree are many—simply because looking at them with a knowledge of what happens in practice, and not from the uninstructed or unpractical standpoint of Mr. Baker, the prepayment meter clause does not appear to embody so much iniquity as he suggests. On the contrary, it seems to us—with one little concession to gas suppliers, and with a provision for the allowance to prepayment consumers, where discounts to ordinary consumers for prompt payment are in vogue, of an equivalent sum from the ordinary price before the extra 10d., or such other lower figure as is thought fit by the suppliers, is charged—that the clause is a workable one, that it meets the respective positions of both gas suppliers and consumers, prepayment and ordinary, and that, therefore, most of the objections are not valid. Saying this sets us in direct antagonism to Mr. Baker's leading proposition that the object of the clause—the securing to the consumer who takes gas through a slot meter the maximum quantity of gas for the minimum payment—"will not only fail, but that such a provision will entail serious disadvantages to the other consumers of the company's gas."

The proof of our allegation that Mr. Baker has not approached the consideration of the clause in full possession of the general practice in dealing with prepayment meters is found in the Blyth and Cowpen illustration to which he refers in support of his contentions. This Company have 1950 slot meters. "Assume," says Mr. Baker, "that the Company see their way to reduce the price by 1d. per 1000 cubic feet, it would mean that 1950 slot meters will have to be re-adjusted, so as to allow the additional quantity of gas to pass through the slot meter for each penny. This might involve taking the meters to the works, adjusting and testing them, and then refixing same in the consumers' premises." The bare contemplation of such an event as having to remove the whole of these meters to the works, adjust and test them, and then refix them, on a reduction of price, is enough to make the practical gas engineer smile. We doubt whether there is a prepayment meter made now that cannot be adjusted to a change of price *in situ*. If Mr. Baker knows of one, he will do well not to take any monetary interest in it; for he may be assured its sale will not be productive of much profit.

However, starting off on his argument with this false assumption, he finds an easy descent into naturally sequent but erroneous notions. He fears that the serious expense which would be occasioned by the work suggested (which there is no necessity for doing nowadays) would operate against the gas suppliers making reductions in price; and this would cause the ordinary consumers to suffer through this supposed difficulty with the prepayment meter system. Not only is the serious expense which he contemplates non-existent, but there are ways and means and inducements of bringing about reductions in price as quickly as they can reasonably be made on improvement accruing in the financial position of any particular gas concern. Mr. Baker does not appear to be aware that in practice when small reductions are made, it is found in most cases convenient to return to the prepayment consumers, on the meter cash-boxes being cleared, the pence equal to the extra number of cubic feet they should have received by reason of the reduction. Besides this, there is the inducement, anyway for companies in most cases, of the sliding-scale to bring about reductions at the earliest possible moment. "Again, the whole of the 1950 meters," remarks Mr. Baker, "would have to be adjusted on the exact day on which

the reduction came into operation, and in the daytime. This would need an army of skilled workmen, the whole expense of which would fall on the Company and indirectly on other consumers." This cannot by any means be regarded as a practical objection. It would be impossible to make a complete adjustment of all the meters in a district on the same day. It never has been done in extensive districts; and there is no occasion to do it. Mr. Baker is evidently unaware that this particular difficulty is also readily surmounted in practice by making an allowance to those prepayment consumers whose meters are not corrected to the changed price on the precise date at which the reduction is made. The objections raised by Mr. Baker so far would lead one to imagine that he fancies gas suppliers have had no experience of these things. But there is experience over several years now in the prepayment meter business, which clearly proves that the difficulties he has conjured up are purely fantastical. The clause only imposes limits; it makes no other change in the condition of things inherent to the system practically from its birth.

The London Gas Companies working under the Metropolis Gas (Prepayment Meter) Act of 1900, from which the Derby clause originated, have not felt these evil influences in any way. The Act has not prevented reductions in the price of gas; but it certainly has had the effect of helping to give London prepayment consumers the maximum quantity of gas and conveniences at the minimum cost. The 10d. excess above the ordinary price is found, best experience tells us, to be ample to cover all costs—even of the occasional re-adjustments of the prepayment meter on alterations of price. It is true that, according to the Metropolis Prepayment Meter Act, the term "fittings" covered by the 10d. includes "pipes, burners, stoves, and other fittings used in connection with the consumption of gas supplied by means of prepayment meters." But even including a slot cooker of a company's regulation pattern for that purpose, there has never, within our knowledge, been any complaint on the part of the London Companies that they are anything but satisfied with the bargain entered into in 1900. If cookers or fires or anything of a pattern in excess of what it is the ordinary practice of a company to give under the system, there is nothing in the Act to prevent an agreement being made with a prepayment consumer for compensating the company for such additional convenience. But the 10d. the majority of gas engineers will admit pays, and, taking all things into account, pays well. There are companies who are doing it for less, though, including a cooker, the 10d. is about fair. Anyway, neither gas suppliers nor consumers, under the 1900 legislation, or otherwise, have ound anything up to 10d. a burden. If they had, there would not have been the remarkable development that has been seen in this system in every city, town, and village of the country. We will hazard the opinion, with past experience to rely on, that no gas supplier of position (other than possibly one in the Midlands) will be found who will raise any real objection to being placed under the tenpenny restriction, nor who will see in it any obstacle to a reduction of price to the ordinary consumer. On the contrary, the gas business done through the prepayment system will tend to hasten rather than to retard reductions in price.

When we come to the part of the clause dealing with the 10 per cent. charge on the cost of the meter, in cases where no fittings are supplied, there is something to be said in favour of a little more latitude here. The preliminary confession must be made that we do not quite understand what Mr. Baker means when he says: "Apparently any charge may be made for providing, letting, fixing, repairing, and maintaining the meter; so that the limit of 10 per cent. on the meter would not be of much avail." The 10 per cent. is clearly the outside possible charge, though it may be contended that it is hardly sufficient for covering repairs and renewals, and the additional expenses attaching to the collections and so forth. This has been a point that has been discussed before the authorities of the Houses in the initial stages of Bills this session. It is understood that Mr. E. H. Stevenson made the suggestion that 15 per cent. would be a fairer allowance; and the idea appeared to be rather favourably regarded by the authorities. Several other gas engineers who practise westwards would, we know, be prepared to support this view. However, Mr. Baker objects that the clause does not state how the 10 per cent. charge for the meter is to be recovered. The most obvious course, the gas engineer would tell him, is to recover it in precisely the same manner as the 10d. is recovered—by regulating the number of feet per 1d. to embrace it. The charge, in this way, of course, could only be an approximate one; but, as soon as a consumer's normal consumption was found, there would be little difference over which complaint could be made either way. The consumers, too, on this system of meter and no fittings, are in the minority; and therefore in any event the suppliers would not be serious losers by a slight undercharge here and there.

It may be readily admitted that provision should be made for the granting to prepayment consumers of any discounts that are allowed for prompt payment to ordinary consumers, seeing that they pay not only promptly, but in advance. As to discounts according to quantity consumed, however, there are few prepayment consumers whose use of gas would be of such magnitude as to entitle them to a discount (where discounts are given for varying large consumptions). There is no sound argument to be made out of this.

Reading the paragraph towards the end of Mr. Baker's article commencing with the words "The clause says—" we do not think he has fully digested what the clause does say in the particular matter to which he there directs attention. "The clause says the Company's Acts applicable to ordinary meters are to be applicable to prepayment meters;" and upon this Mr. Baker founds argument. But the clause says nothing of the kind. What it does say is: "The Company's Acts applicable to ordinary meters shall, *so far as applicable*, apply to prepayment meters." Where this would lead to confusion and difficulty passes comprehension. Mr. Baker connects this up in some mysterious way with "an additional charge at the end of each quarter for rent of meter, cost of fixing, repairs, and collection." It seems to us that it is Mr. Baker and not the clause that is confusing in this particular connection.

In regard to the rest of the article, very strong evidence must be forthcoming to convince us that the final decision as to the quantity of gas consumed should rest with the pence placed in the slot of a meter rather than with the index. The fact that the clause in question only appeared in the Derby Act last session is not important; and we have no particular care as to whether or not it is generally inserted in Gas Acts in the future. But we cannot bring ourselves in accord with Mr. Baker in seeing hidden within it all sorts of detrimental influences. It must be submitted that he is mistaken in the greater part of his conclusions.

INCANDESCENT GAS LIGHTING IN FRANCE.

In the "Journal" for Nov. 3, we reproduced from "Le Gaz" some particulars collected by M. Jouanne in regard to installations of the incandescent gas system for public lighting in French towns. A recent issue of our contemporary contained the following additional information on the subject by the same writer, who is the Technical Editor of that periodical.

In the previous article, reference was made to the adoption of Lacarrière burners (the Houdaille and Triquet system) for the lighting of Nantes and its environs. The work comprised the alteration of the 1700 existing lanterns and the addition of 500 new ones—bringing up the total number of street-lamps to 2200. The new system has been in operation for some months, and the results obtained have been so satisfactory, that the European Gas Company have decided to extend it to the suburban communes—the burners to be of the same type as those in the town. These burners have also been under experiment by the Municipality of Auxerre, with the result that it has been decided to adopt them generally; and the necessary alterations to the lanterns are in progress.

At Armentières, the question of the gas supply of the town has been under consideration. Here, however, there has been something more than a mere alteration in the lanterns. The existing contract terminates on Dec. 31, 1917; but the Imperial Continental Gas Association have been granted an extension for a further term of fifty years, on the following conditions: (1) A reduction in the price of gas for both public and private consumption; (2) the general adoption of incandescent gas lighting; (3) the installation of electric lighting for private consumers in the centre of the town. The charge to ordinary consumers was 23·75c. per cubic metre, or 5s. 5d. per 1000 cubic feet; but it was reduced to 22c. from the beginning of the year, and a further 2c. will be taken off on Jan. 1, 1918. On these prices, the town will receive a royalty of about 2¾d. per 1000 cubic feet, which, according to the estimated consumption, will produce an annual revenue of something like £400. For the municipal establishments, the charge will be reduced from 15c. to 13c. per cubic metre—say, from 3s. 6d. to 3s. per 1000 cubic feet. For gas used for motive power, the price has been lowered from 4s. 6d. to 3s. 4d. per 1000 cubic feet, with a decreasing scale according to the quantity consumed; and the Municipality will receive a royalty of the above-named amount on this gas also. The new contract is therefore advantageous for the Association, inasmuch as they get under it an extension of their concession, and it is equally so for the townspeople, who will derive a double benefit—first from incandescent gas lighting in the streets, and secondly from the royalties which will swell the municipal exchequer.

At Tourcoing, the gas-works belong to the town, and are under municipal control; the Manager being appointed by the Council. The incandescent gas lighting in the streets is very satisfactory; while the maintenance charges are lower than in many French towns, particularly Paris. The renewal of mantles, chimneys, and burners costs the town 9 frs. per annum for No. 2 burners, and 11 frs. for No. 3. At Douai, the streets are lighted by incandescent gas-burners. Here, however, the installation has been carried out by the Gas Company, who replace mantles and chimneys; their only compensation being the smaller consumption of gas. The public lighting is being altered at Lille; but, under an agreement between the Municipality and the Gas Company, the latter are doing the work, receiving 5 frs. per burner per annum for maintenance.

The Municipality of Cambrai have undertaken the alteration of the public lamps for the incandescent system, as well as the renewal of the mantles and chimneys. Where new lamps, fitted with No. 3 burners, are put up, the Gas Company undertake the maintenance, and benefit by the difference in the quantity of gas consumed, averaging 0·5 cubic foot per burner per hour, which represents about 14 frs. profit on each burner as a set-off to the

cost of renewals. At Valenciennes, also, the Municipality bear the expense of altering the lanterns, and they will pay for renewals at the rate of 12 frs. per No. 3 burner. The saving in consumption by the substitution of incandescent mantles for the old batswing jets will amount to about 11 frs. per burner per annum. The arrangement with regard to maintenance is subject to revision every three years, with the view of taking advantage of any reduction in the price or improvement in the durability of the mantles. At Soissons, the Gas Company have themselves introduced the incandescent system for lighting the streets; and they defray all the expenses of maintenance. The reduced consumption of gas, however, results in an economy of 11 frs. per annum for No. 2 burners, and 13 frs. for No. 3.

At Nîmes, the cost of altering the lanterns for the incandescent system and the maintenance of the mantles, &c., are borne by the Gas Company; but they save 1·75 cubic feet of gas per burner per hour by the change. At Lyons, the Municipality paid for the alteration of the lanterns; but the Gas Company renew the mantles and chimneys, and receive 16 frs. per burner per annum for the work. At Nancy, all the initial charges were borne by the Municipality, who also attend to renewals, which cost 18 frs. per burner per annum. At Béziers, where the Gas Company undertake the maintenance, the annual cost is 13 frs. 75c. for No. 2 and 11 frs. 75c. for No. 3 burners.

The examples given by M. Jouanne show how varied are the conditions under which the incandescent system of gas lighting has been installed and is carried on in French towns, and, consequently, how difficult it would be to lay down a rule which would be generally applicable. The special circumstances of each town must enter largely into the calculation of the expense of changing from the old to the new system; but a little extra cost is far outweighed by the manifest improvement effected in the lighting.

TESTS OF STREET-LAMPS IN WESTMINSTER.

The sixth quarterly report of Mr. J. W. Bradley, the City Engineer of Westminster, on the testing of street-lamps, with a statement of comparative costs, has been issued. This completes the tests over a period of eighteen months; and the figures he now gives are not in any degree less interesting than those to which it has been a pleasure to call attention on previous occasions. It is unnecessary to go over the ground formerly traversed, nor (as has been done before) to specially comment on those matters which we believe tend to vitiate the results arrived at by Mr. Bradley. In dealing with the September report (on Nov. 10 last), the tabulated total costs were given. These costs do not vary from the figures appearing in the present report; and therefore from this one, we are only publishing the results of the tests and the calculations arising from them.

Tests of Street-Lamps (Gas and Electric), with Statement of Comparative Costs extending over a Period of 18 Months.

Description and Position of Lamps.	Average Candle Power.	Total Cost per Candle-Power per Hour.	Test No. 6. Total Cost per Candle-Power per Annum.	Average Total Cost per Candle-Power per Annum, including all Tests up to Date (Six Series).	Total Number of Tests up to Date.
		d.	d.	d.	
Electric arcs (Charing Cross and Strand Electric Light Company), with opalescent globes	670	·00273	10·75	*11·49*	40
Electric arcs (St. James' and Pall Mall Electric Light Company), Muranese globes	474	·00445	17·23	*15·1*	43
Electric arcs (Westminster Electric Supply Corporation), opalescent globes .	605	·00222	8·73	*8·7*	35
Refuge lanterns (four mantles) Victoria Street	113	·0072	28·3	*30·7**	24
Sugg's high-pressure lamps, Parliament Street . . .	573	·00194	7·65	*9·85*	35
Incandescent mantles, Victoria Street type	42	·00508	20·0	*18·42*	40
Triple flat-flame footway, Whitehall (Scott-Snell lamps since substituted) .	51	·0076	29·9	*25·65*	33
Incandescent mantles, Carlton House Terrace type .	38	·00465	18·3	*18·18**	27
Triple flat-flame, Strand type	47	·0122	48·2	*47·44**	30

* Average of five series only.

The following note is appended by Mr. Bradley to his report, which note, though not expressly so stated, is obviously directed to our previous criticisms of the method of testing street-lamps being an acceptable criterion of their value:—

In order to anticipate any objections which might arise on comparing the figures obtained for the various lamps, I have the following comments to make on the tests. All tests are carried out under precisely similar conditions, so that it would be manifestly unfair to accept one set of results and reject the rest. The Sugg photometer which has been used in making these observations is fitted with 2 and 5 candle standards for testing low and high power lamps respectively, and will, from its construction, give results in all cases, if anything, slightly higher than the true values by a small amount which is practically constant for all the types of lamp tested; thus making the comparison of the various lamps approximately accurate. Further, precautions are duly taken during each test to guard against the effect of extraneous light, reflection from buildings, obstruction by any opaque object (such as glazing bars) and the tests are only carried out on clear nights.

In the case of incandescent mantles, including high-pressure lamps, great variations in candle-power are found to be due to the condition of the mantles—what appears to the naked eye as a slight diminution in intensity resulting in an enormous loss of candle-power. In the case of lanterns with groups of incandescent mantles, it should be remembered that such mantles are difficult to keep in good order, and that the effective candle-power does not increase in the same ratio as the number of mantles. It has been repeatedly found that a slight defect in any of the incandescent mantles in high-pressure lamps causes a great loss of candle-power; and this circumstance renders it difficult to form any comparison between tests carried out in a laboratory and those made under actual lighting conditions.

With reference to the first part of the note, we must still adhere to the view that the perambulator photometer cannot be relied upon to record the true values of the lamps under the conditions of the tests—especially of cluster incandescent gas-lamps. A few figures are before us giving results of tests obtained by Mr. Sugg of high-pressure lamps lighted and maintained by the South Metropolitan Gas Company. While the lamps on Blackfriars Bridge, fitted with single high-pressure burners, gave an average of 315 candles, the lamp in the northern approach to the bridge, which is fitted with four 300-candle power burners—the same as those on the bridge—only returned about 800 candles, when it should have been at least 1200 candles. This is attributable to the obstruction of the light by one mantle and a part of another, and from the position in which the test had to be made. In these tests (owing to the traffic preventing the photometer being placed on the ground) a van was employed, giving a distance of 6 feet from the road surface to the disc.

In such circumstances, too, it was quite impossible to get the benefit of both sides of the reflector. The question of the reflector is very important; and it must be admitted that, with any reflector, the benefit of all the reflecting power is not obtained in the photometer. In the case of the "Whitehall" lamps referred to in the above table, there are two reflectors—one being a small conical reflector (concave), which reflects the light from all the burners downwards on to the pavement surrounding the lamp column, with the object of enabling the drivers of vehicles to see persons standing at the foot of the column ready to cross the road. In any case the advantage from only one side of this reflector is secured in the photometer; and, therefore, it is only fair that the light round about the post ought to be reckoned by itself. It is really the most powerful and useful light thrown on the road.

It is true that, in the case of a number of incandescent mantles, there are great variations in candle power, which variations are partly due to the time the mantles have been on the burners. But with mantles which have a sufficient amount of thorium in the web, they lose little, if any, illuminating power, even though they may have been in use for a month. With mantles which have not so much thorium in them as they ought to have, there is no doubt the illuminating power does diminish in a very short time. With respect to lanterns containing groups of burners (especially low-pressure burners), the effective candle power does not increase in the same ratio as the number of mantles, because of the obstruction of the light by the mantles. Therefore, it is better to use instead burners of a high illuminating power. We know that Mr. Sugg has lately been experimenting with some which will give a light much in excess of those used in the "Whitehall" lamps, and which will, he assures us, give a photometrical result of about 32 candles per cubic foot of gas consumed.

Regarding the tests of electric arc lights, an expert in these matters of lighting calls attention to this, that there is always a great difference in the illuminating power of one side of the lamp from that to be obtained in the exactly opposite direction. This, it is said, is caused by the shadow of the crater of the lower carbon, which always burns down with one side of the crater higher than the other side—for example, it may be found that with 600 candles in one direction, in the opposite direction (according to the shape and height of the edge of the crater) there is only about half that result.

Mr. W. J. Sisson, the Chairman of the Wrexham Water Company, whose death was recorded in the "Journal" for the 12th of January, left estate worth £58,095.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 720.)

BUSINESS on the Stock Exchange is going from bad to worse in point of volume; and if zero could possibly be reached, it would really seem to be not far off. Apart from a little investment buying, which is, so to speak, unavoidable, there is not the slightest disposition to do anything at all—except to wait and see what is going to happen next. The admirable secrecy maintained regarding Japanese movements produces a trying tension in monetary markets. But though so quiet, they were fairly firm right up to the close. The fortnightly settlement was light, and gave rise to no difficulties. The Money Market was quite easy; and such demand as existed for Stock Exchange requirements and in other channels was met with ample facility. Discount rates were slightly easier. The Gas Market opened with a great promise of activity. The next day, however, it quieted down to very small proportions; and though it quickened up somewhat later on, it never got into real swing again. Movements were almost next to nothing, except in the case of one or two foreign undertakings which have lately been freely offered in the absence of buyers. Apart from this feature, things may be noted as steady. In Gaslight and Coke issues, the ordinary was very active on the whole, though on some days it fell away drowsily, and the price was as steady as it could well be. It never ranged outside 86½-87¼; and the closing mark was equal to the best of the week. The secured issues were not strong generally; and the preference had a fall of a point-and-a-half. South Metropolitan was fairly active, but rather unsteady; the price jumping about from 116½ to 118. There were no transactions in Commercials. In the Suburban and Provincial group, hardly any business was done all the week. Two or three undertakings were, however, quoted *ex div.;* and the turn of the prices was in their favour. In the Continental Companies, European was quiet and firm. Union had a sharp fall of 7 points; and it changed hands several times at 103. Imperial was flat, and closed at 192; but the quotation was only put down 1. In connection with the remoter undertakings, San Paulo announce a reduction in the rate of dividend to 7 per cent. Some moderate business was done in the Water Companies; and the general tendency was firm. A few modest advances were marked in two or three stocks; and the general situation looks healthier now it is free from the feverish jumps that quotations were apt to take a little while ago.

The daily movements were: On Monday, Continental Union fell 7. On Wednesday, Gaslight preference fell 1½. West Middlesex Water advanced 2. On Thursday, *ex div.* variations in all Gas stocks were favourable; but Imperial fell 1. On Friday, Southwark Water rose 2; and on Saturday, it rose 1 more.

ELECTRIC LIGHTING MEMORANDA.

Progress in the Use of Electricity—The Element of Speculation—The Utilitarian Philosophy Outraged by Municipal Traders—Failure of the Electric Lighting Acts to Protect the Public—The Finance of House-Wiring.

AN interesting survey of the progress in the use of electricity was recently published in "Engineering." It is not very often that such a review appears in a leading technical periodical not identified with the electrical industries; and the one in question is based upon the statistics of the new Garcke's "Manual," for the present year. Our contemporary's judgment on the figures given in this publication is, that municipal authorities have proved to be the principal obstacle to the general use of electricity—a somewhat startling theory, and one that can hardly be reconciled with the facts of municipal trading enterprise in this direction! Rather should we be disposed to put it that, but for what has in numberless instances proved the ill-advised adventure of local authorities into this class of municipal enterprise, many localities actually provided, after a fashion, with central electricity-supply undertakings would most likely have gone without them. There is another observation of our contemporary on the subject to which we must really take exception. It is asserted that, "although private companies demonstrated the superiority—alike as regard (*sic*) illumination and economy—of electricity, they have not, taking them in the aggregate, had the recompense that was their due." Now, this pretended superiority of electric light in the leading respects mentioned, can only refer to older established means of lighting, the chief of which, of course, is gas. If the facts are as stated, there can be nothing "speculative" in the working of central stations for the supply of the superior illuminant by anybody. Yet elsewhere it is asserted that municipal electricity supply is a "somewhat speculative procedure," which local authorities have been afraid of themselves, and yet have rendered onerous and hazardous for private promoters to undertake.

In sober truth, there is not much "speculation," in the sense of hazard, about the business of electricity supply. The conditions of success (within the realizable limits) and of comparative failure are pretty well known by this time, as they have long been by competent persons. The electric lighting companies who were in the field betimes, together with some who have known how to draw profit from the mistakes and mishaps of their precursors, are doing pretty well. The best Metropolitan Companies have nothing to complain of, but are reaping a handsome reward for their enterprise and skill in creating a new industry by means which local authorities were lucky in being able to copy. Those who prate about the remarkable "enterprise" of municipalities in the matter of electricity supply, should be reminded that but for the daring of the private pioneers they would never have had any examples to follow. There is not much difference in principle between the allowing of a private company (as in the case of Liverpool) to prove the thing practicable, and thereupon to be bought out, and copying a scheme of working that is seen to answer elsewhere. So far as the large manufacturing communities of the Kingdom are concerned, it was plain from the first that they would wish to provide their own electric lighting. So that there cannot be said with truth that there was any speculation about their proceedings. And as to the small local authorities which the consulting electrician is painfully gathering in at the present time, it is to be feared that reckless disregard of the reasonable certainty of loss on the part of the members of these bodies, rather than any tendency to speculate in the proper sense of the word, is at the bottom of their action.

It was a cardinal tenet of the Utilitarian School of Political Economists, that mankind would always act in accordance with their own ascertained and palpable interest. This conclusion appeared to them as incontrovertible as a rule of arithmetic. When it was brought home to the perception of the English people, they proceeded to frame the national fiscal system upon it. To buy in the cheapest and sell in the dearest market, was made to appear the whole duty of economic man; and this is the creed in which almost every British adult now living was suckled. We resolutely shut our eyes to the innumerable infractions of this rule which we committed ourselves, and might have seen perpetrated by others all round our shores. Similarly, the Electric Lighting Acts were drawn up in agreement with the rational belief that British local authorites, having demonstrably no other interests but those of the greater number of their ratepayers to serve, would act only in this sense. It is not to be supposed that Parliament, in passing these Acts, expected for a moment that the thing which has really happened would occur, and whole communities be compelled to pay increased rates in order that a mere handful of their number, and those the well-to-do, should have electric lighting under cost price.

The result in question has come to pass, in many localities, because the local governing man is not the economic, self-interest-regarding abstraction of the arm-chair economists, but a human being swayed by impulses which are not at all rational—often quite the contrary. Municipal man may honestly believe that it would be a fine thing for the community which he represents in local self-government to have the latest new and fashionable thing in artificial lighting; but he is much more likely to fall a victim to his ignorance of the proper way to estimate the prospects of an undertaking of this kind, and also to his prejudice against the local gas company. Often, swayed by this kind of prejudice, men will commit the gravest follies, even against their own interest. Nay, local authorities have been known to entertain such irrational animosity against one another, as to place obstacles in the way of mutual railway or tramway accommodation. This is absurd; but it is nevertheless true to life, as everybody knows. Knowledge of life is of the very essence of the necessary training of a man of affairs; yet in how many instances has even the British Legislature, which is nothing if not sensible, played into the hands of the prejudiced and unreasonable among the people, in deference to abstract principles good for nothing but copy-book headings? Returning to the subject of local authorities' senseless prejudices against gas companies, which so often instigate them to the perpetration of costly extravagances in the way of municipal electric lighting, it is, of course, notorious that the same line of conduct will be followed indifferently in regard to a local electricity supplying company, if there happens to be one in existence. Therefore, it is not so much the delinquency of the gas company that attracts the despiteful usage of the municipality, but the imperfect humanity of the latter which drives it awry. The leading case of the Marylebone Borough Council, formerly the Vestry, establishes this fact.

On the burning question of house wiring, the opinion of "Engineering" is that electric lighting companies have the advantage of municipalities, through being able to risk their money in this way. It is further suggested as desirable that the payment of hire for wiring should be terminable, and be arranged by agreement with the landlord instead of with the tenant, whose interest in the property is usually for some period short of three years. Unquestionably, the wiring question lies at the root of the success of electric lighting in most localities, and the inability of local authorities to spend public money upon it is greatly to their disadvantage as traders in electricity. But the remedy is obvious. Coupled with the increased cost of capital to local authorities, which removes one of the familiar arguments in favour of municipal trading, it means that central station electric lighting ought to be left more and more to private enterprise, which must at any rate correspond with a real want in order to command any measure of success, and cannot rob the poor ratepayer to gratify the well-to-do resident.

DESCRIPTION OF THE MARIENDORF GAS-WORKS OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

CONSTRUCTION COMMENCED APRIL 25, 1900, COMPLETED OCT. 21, 1901.

By E. Drory, Chief Engineer, E. Körting, Engineer, and H. Schüller, Clerk of the Works.

(*Continued from p.* 623.)

Purifying Apparatus.

The naphthalene washer requires a certain temperature for the crude gas; and this fact had, therefore, to be considered when laying out the gas outlets in the retort-house and in the sub-division of the apparatus in the various houses. The gas-mains in the retort-house may well be utilized as preliminary coolers. For this purpose, 600-mm. (2 feet) wrought-iron pipes are placed behind each hydraulic main above the furnaces, and outside the retort-house. These two pipes are connected with each other at different places along the length of the retort-house. It is hence possible, in very cold weather, to keep the gas flowing entirely inside the house, whereas during times of great heat, it may be kept outside, or half in and half out in normal weather. In this way, the temperature in the naphthalene washer may always be kept between 77° Fahr. (25° C.) and 110° Fahr. (35° C.). At the west end of the retort-house, the two lengths of 2 feet diameter mains are united in a pipe of 3 feet diameter. This now dips into the ground, giving off its products of condensation automatically into the tar-tank situated close to the retort-house, and then rises sharply about 15 feet to the apparatus. These, as was remarked before, have to be kept part warm and part cool. For this reason—as also for that of better illumination—it was considered expedient to divide the apparatus into two buildings (see fig. 6). No. 1 accommodates the exhausters (fig. 7), tar, naphthalene, and cyanogen washers (fig. 8), as well as the Roots' blower; No. 2 contains the condensers (fig. 9) and "Standard" washer-scrubbers. Both houses were built in a hollow of the original land, so that the foundations had to be carried more than 12 feet below the original level of the soil. In this way, it

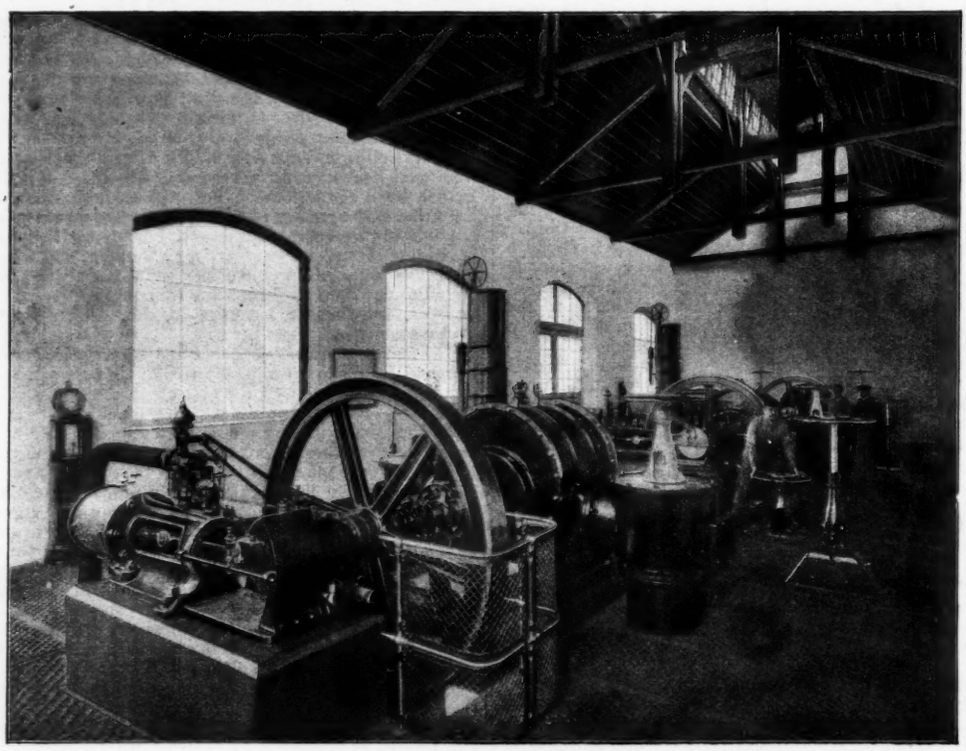


Fig. 7.—The Gas Exhausters.

was possible to construct spacious pipe-chambers beneath the machine-rooms without much additional outlay.

These cellar-chambers (fig. 10) are so high that it is possible to walk under the main pipes, which are set on pillars. The ceilings consist of cast-iron open-work plates resting on wrought-iron supports, both ventilation and illumination being, in consequence, excellent. All products of condensation flow off automatically. There is only one syphon on the works needing to be pumped out by hand.

Sub-Division and Size of the Apparatus.

[The figures within brackets signify the number of each type at present erected.]

3	(1)	Retort-houses	of	120,000	cubic metres capacity per 24 hours.
6	(3)	Exhausters	,,	60,000	,, ,, ,,
6	(3)	Tar-washers	,,	60,000	,, ,, ,,
6	(2)	Naphthalene washers		60,000	,, ,, ,,
6	(2)	Cyanogen washers		60,000	,, ,, ,,
8	(6)	Reutter condensers of 269 square metres, 45,000 cubic metres cooling surface.			
4	(3)	Ammonia "Standard" washers of		90,000	cubic metres.
6	(2)	Sets of purifiers of		60,000	,,
4	(2)	Station meters of		90,000	,,

The exhausters (fig. 7), like most of the other apparatus, were supplied by the Berlin-Anhalt Machine Company, and are geared directly to the steam-engine. They have Dessau bye-pass governors, and are provided partly with Hahn's and partly with Pintsch's governors. They drive the gas first into the Drory tar-washers, which are disposed in the usual manner, unless the successful use of drums with three (instead of two) concentric sieves be considered a novelty.

Thereupon follow the naphthalene washers, which are not, as is usually the case, combined with the cyanogen washer in one apparatus, but treated as separate washers, fitted with three duplicate chambers. This arrangement has the advantage that any interruption in the work of the cyanogen washer is not, of necessity, followed by the throwing of the naphthalene washers out of action; and, moreover, the washing liquid may be made use of to better advantage.

The cost of naphthalene purification is as follows:—

10,000 kilos. of creosote oil, with a value of 500 marks, purify 1,800,000 cubic metres of gas.
10,000 kilos. of spent creosote oil, with a value of 300 marks, sold as tar.
10,000 kilos. of creosote oil, at a net cost of 200 marks, purify 1,800,000 cubic metres of gas.
0·55 kilo. of creosote oil, at a net cost of 1·1 pfgs., purify 100 cubic metres of gas.

If we take another 2·9 pfgs. per 100 cubic metres for motive power, repairs, and amortization of the cost of the washer, we find that the total cost of the naphthalene purification is 4 pfgs. per 100 cubic metres (0·18d. per 1000 cubic feet). The cost is not, therefore, of much consequence; but the results are most satisfactory. In the communes supplied by the Mariendorf Gas-Works the number of stoppages attributable to naphthalene greatly diminished the first year; and on the works no trace of it is to be found.

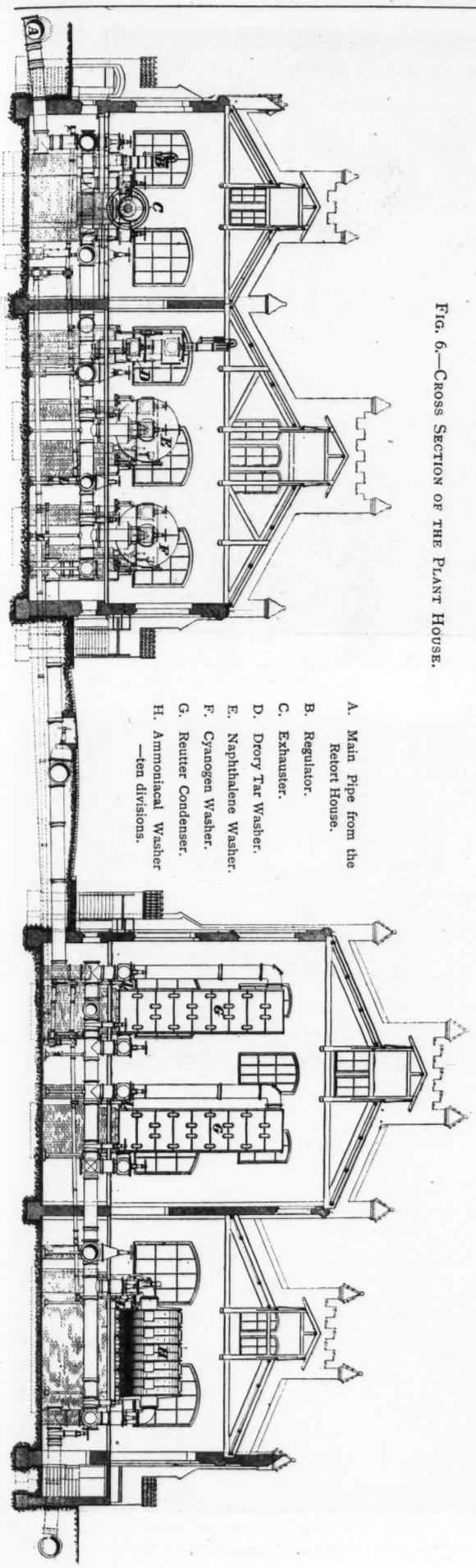


FIG. 6.—CROSS SECTION OF THE PLANT HOUSE.

Rather more work than the naphthalene washer (which only requires to be pumped out after passing 180,000 cubic metres of gas) is occasioned by the cyanide washer, where this operation has to take place already after 30,000 cubic metres being passed, besides the iron solution having to be prepared for it. The sulphate of iron is kept in the cellar, and is brought up by means of a block and travelling trolley to the cast-iron mixing-tank on the ground floor. The tanks for the prepared solution of iron, as well as for the creosote oil, are situated immediately below the floor. A raised tank alongside the railway sends creosote oil into the plant-house; while a second tank close by receives the saturated cyanide sludge for conveyance to the railway waggons.

The cyanide washer absorbed in 1902 28 per cent. of the production of ammonia, and yielded 3·56 kilos. of prussian blue per 1000 cubic metres of gas. The ammonia was utilized without causing loss, as the ammonia works are situated at a great distance from all the gas-works, and accordingly operate at a disadvantage.

The same price per unit is obtained for the cyanide in the sludge as for the prussian blue in the spent oxide. The advantage lies, therefore, in the greater yield consequent on the complete absorption of the cyanide, which at present prices gives but a modest profit. To this should certainly be added that the most can be made of the dry purification for sulphuretted hydrogen, and the probability that the numerous appliances, which were formerly strongly attacked by the cyanogen contained in the gas, will now have a much longer lease of life. This is a kind of profit which cannot well be set down in figures, but which is nevertheless considerable. The cost of the cyanogen washer is recovered in the relief of the condensers and ammonia washers.

In No. 2 apparatus house (the cool house), the condensers are so placed that the groups of two may be worked either simultaneously or consecutively at will. The first method is followed in winter; the second in summer.

The weak liquor given off between the retorts and the exhausters is (with the exception of a small quantity required in the tar-washer) taken up for the continuous sprinkling of the gas as it flows through the condensers. The ammonia "Standard" washers have five double chambers, and are fed with pure water only.

To test the efficiency of the installation, and to ascertain the average figures of a December day of 24 hours, 23 December days were carefully tested. There were two exhausters, two tar washers, one naphthalene washer, one cyanogen washer, two condensers of 261 square metres cooling surface, and one "Standard" washer at work.

Average Results in 24 Hours.

Production of gas. . . 64,900 cubic metres (2,291,000 cubic feet)

Temperatures.

Atmosphere at 6 a.m. in the open air.	− 3·25 C.
Gas entering below ground in retort-house	+ 37·8 ,,
Gas at inlet of tar-washer, about 180 metres from retort-house	+ 27·3 ,,
Gas at inlet of Reutter condensers	+ 24 ,,
Gas at outlet ,, ,, ...	+ 12·2 ,,
Gas at outlet of ammonia washers	+ 11·2 ,,
Atmosphere in No. 2 apparatus house	+ 7·4 ,,
Cooling water on entering condensers	+ 12·9 ,,
,, ,, on leaving condensers.	+ 18·4 ,,

Consumption of Water and Liquor.

	Cubic Metres.		Degrees Beaumé Strength.
Weak ammoniacal liquor in two tar washers	2·88	at entrance	1·58
		at exit	2·56
Cooling water for two condensers . .	147·4		
Weak liquor for condensers	14·4	at entrance	1·58
		at exit	3·15
Pure water for ammonia washers . .	1·44	at exit	3·4

The above figures show clearly that the condensers and ammonia washers could cope with considerably more than 65,000 cubic metres of gas, and that these are actually greatly relieved by the introduction of the naphthalene and cyanogen washers, and the new sequence of the apparatus consequent thereon.

PURIFIER-HOUSE.

The construction of a purifier-house is in a great measure dependent on the state of purification technics for the time being. We know nowadays that the purifiers need hardly be changed at all if they are only chosen large enough, and 2 per cent. of air sent through with the gas. We are, therefore, very near the ideal of inodorous purification in closed vessels; the more so as since the introduction of Dr. Bueb's cyanogen recovery process the revivifying of the oxide, at a certain cost for labour, hardly appears to repay the outlay.

It is quite conceivable, when each of the five charges of oxide appertaining to one set of purifiers has been once through the first box, that the old oxide may already be thrown out of use. The only objection to this proceeding is the cost of the fresh oxide. Let us take this cost as 3600 marks (£180) for one set of purifiers, and that the labour for changing comes to 200 marks (£10). This would bring the yearly expenditure for oxide to:—

3600 marks (£180) if it holds out one year.
1800 ,, (£90) ,, ,, ,, two years.
1200 ,, (£60) ,, ,, ,, three years.
900 ,, (£45) ,, ,, ,, four years.

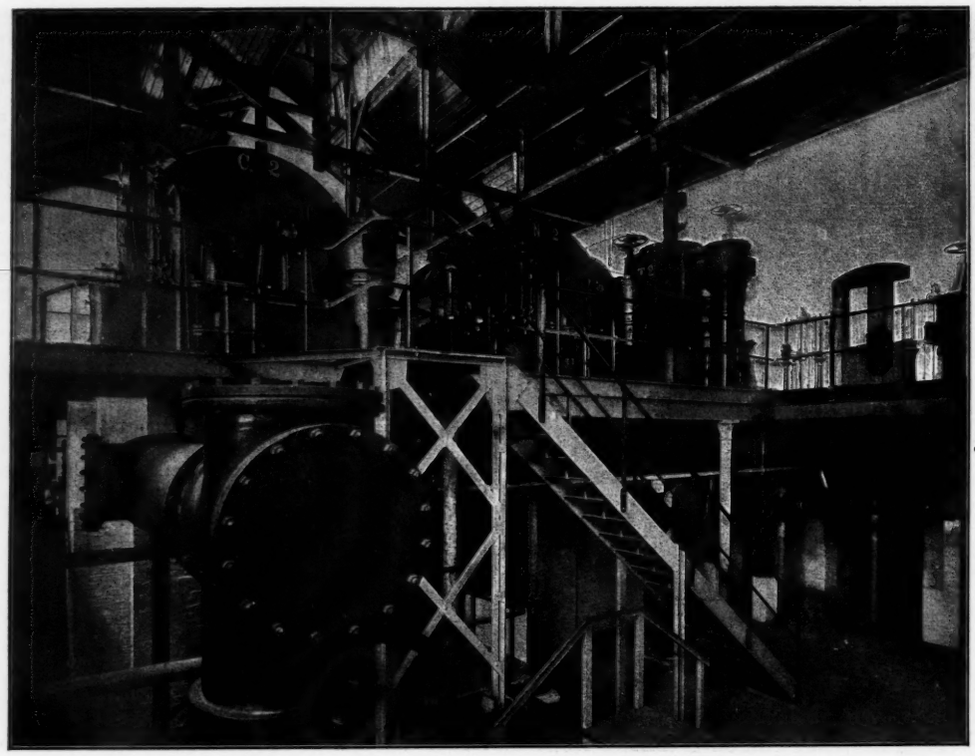


FIG. 8.—THE TAR, NAPHTHALENE, AND CYANOGEN WASHERS.

During the first two years, changing need not be much reckoned with, and the oxide would only be kept three years if it could be depended upon that the third year would not necessitate at the utmost more than 1800 marks (£90) for wages, or nine changes more than the second year. The entire work in the purifier-house—the emptying and refilling of the purifiers, the turning-over of the oxide, &c.—is therefore being more and more thrust into the back-ground, and no longer has any influence on the cost price of the gas.

Therefore the adoption of mechanical means of transport, for turning over the oxide, &c., in the purifier-house, can only be termed highly unremunerative. The simplest and cheapest arrangements should suffice here. The construction of the Mariendorf purifier-house (fig. 11) is founded on this train of thought. Two rows of purifiers are installed in a lofty room, well ventilated by a skylight, provided with numerous windows running the entire length of the building. Two lower side annexes, with wooden roofs, serve to revivify the oxide.

The tops of the purifiers are level with the floor. For filling and emptying the boxes, narrow-gauge rails are placed across and across, upon which run very low trucks. The greater number of the purifiers have already served in Vienna, and have water-luting; the smaller number are of a newer type with rubber-luting. The cost of both models is about the same. In the case of the rubber-luting, the covers have to be as rigidly built as possible; therefore a purifier 31 ft. 6 in. square must have at least two covers, and, consequently, a central stage to which to secure the covers. The area of space for the men working in the box is thereby narrowed, and the cost of labour increased by 20 per cent. If one further considers that the rubber-luting is very costly, and will only last a limited number of years, it is clear that only water-luted purifiers will be considered for future extensions.

A few items from the working results will be of interest. Two sets of purifiers were always simultaneously connected.

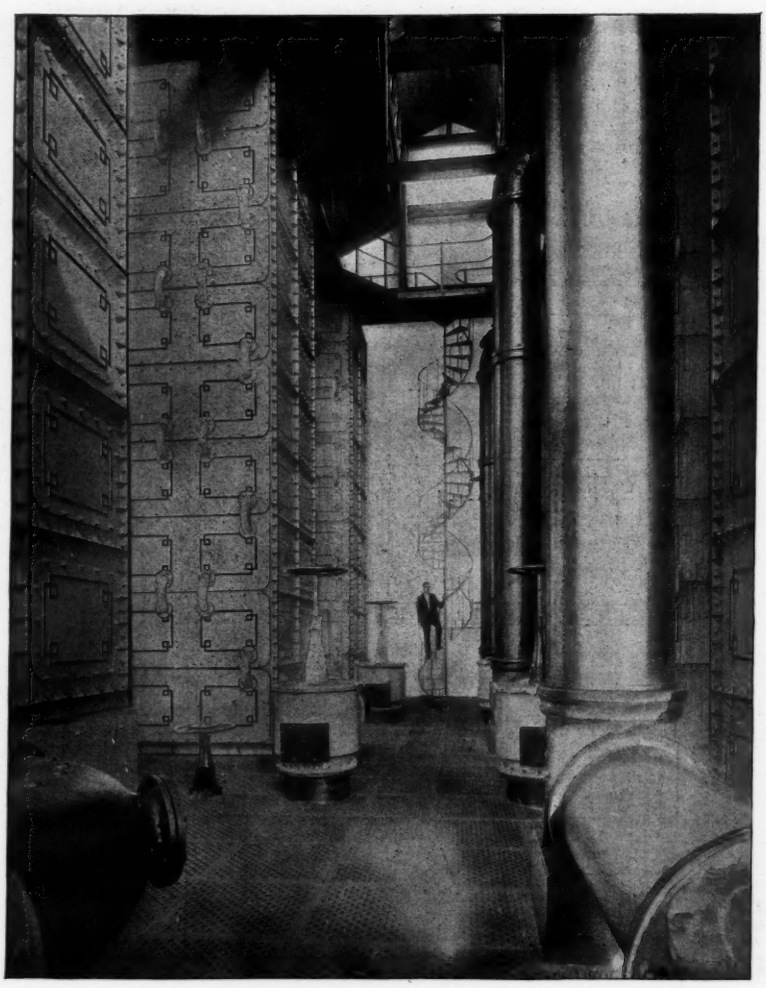


FIG. 9.—THE REUTTER CONDENSERS.

FIG. 11.—THE PURIFIER HOUSE.

FIG. 10.—THE CELLAR UNDER THE WASHER HOUSE.

Two purifiers (one of these sets) have together a transverse section of 168 square metres (1820 square feet). With an annual gas production of 15 million cubic metres, there would be about 11 square metres of purifying surface for every million cubic metres, or, with a maximum daily production of 70,000 cubic metres, 0·24 square metre of purifier section for every 100 cubic metres of gas. This means that the maximum velocity is not above 5 mm. per second.

It should be added that the cyanide washer takes up 10 to 20 per cent. of the sulphuretted hydrogen, and that all the oxide in the dry purification—formerly taken up by the cyanide—is now left free for the sulphuretted hydrogen. Under these conditions, very favourable working results were to be expected, and have indeed been attained. Since the 1st of June, 1902—that is, from the day when air was first injected—up to time of writing these lines [the end of December, 1903], there has been but one box changed, and that only because it was almost saturated at the time the air-injecting began. During this long period, the pressure on the three consecutively connected purifier-boxes was uniformly between 15 and 20 mm. The oxide had, therefore, not become any less porous—probably because the gas was passed through the purifiers from the top to the bottom.

The outlay for wages was consequently only 1 pfg. per 100 cubic metres of gas, only a small portion of which was occasioned by changing, but by far the greater part for superintendence, &c. The other two large works of the Imperial Continental Gas Association in Berlin have no cyanide washers, and only about 7 square metres of purifier surface per million cubic metres of annual production, and have therefore to pay about 7 pfgs. per 100 cubic metres for purifying wages.

With a retort-house of 25 million cubic metres annual capacity, there would result an economy of 15,000 marks by the use of correspondingly large purifiers. Capitalized at 10 per cent., this economy would be equal to a sum of 150,000 marks (£75,000); and this is more than sufficient for an ample extension of the purifying surface. The construction of very large purifiers may be said to be a good stroke of business, apart from the fact that the changing of the purifiers always causes noxious exhalations—making this rank as unpleasant work; and, finally, it is always accompanied

by a certain amount of danger. During the present winter, there will probably be some 120,000 cubic metres of gas produced in the retort-house; and the purifier section will be reduced to 0·14 square metre per 100 cubic metres of daily production. The velocity of the gas will, therefore, be far above the normal; and it will then be shown whether the advantages derived from the cyanide washer will allow a higher velocity in future and smaller purifiers, or whether the old figures retain, more or less, their validity.

On works where space is wanting, the revivifying room has usually to be placed above the purifiers; and it would appear at first glance as though the higher cost for construction entailed thereby would be compensated by the cheaper mechanical working. According to the working results which have come to our knowledge, this is by no means the case. The following table shows three purifying plants with revivifying floors above, compared with three plants with revivifying floors in side annexes. The plant at the Erdberg Gas-Works, Vienna, was technically a success. Tilting trucks with two wheels were let down into the purifier by a steam-crane, and raised to any part of the floor above for further conveyance. The fresh oxide was sent down by means of flexible tubes, long enough to reach all parts of the box. The plant at the Gitschinerstrasse works, Berlin, is worked on similar principles—hydraulic cranes being used; whereas at the Charlottenburg Gas-Works the old oxide is shovelled through the bottom of the purifier into trucks, which are then sent up to the floor above by lifts.

Emptying and Filling Purifier, Inclusive of Lifting-Off and Replacing the Cover.

Working Hours per Cubic Metre of Material.

With Revivifying Floor above.		With Revivifying Floor at side.	
Erdberg, Vienna	3·16	Erdberg, Vienna	3·31
Charlottenburg	2·48	Schöneberg, Berlin	2·19
Gitschinerstrasse, Berlin	1·70	Mariendorf, Berlin	2·08
Average	2·45	Average	2·53

OBITUARY.

The death occurred on the 7th inst., in his 78th year, of Mr. R. Jefferson, J.P., the Vice-Chairman of the Derby Gas Company, of which he had for some years been a Director.

By the recent death of Mr. Edward Jones, the Oswestry Gas Company have lost their Chairman. Deceased, who was 77 years of age, did valuable work in the public life of the district.

Great will be the regret among gas engineers, particularly in the Midlands, to learn that Alderman J. Annan, J.P., formerly Engineer to the Wolverhampton Gas Company, breathed his last on Sunday evening. A member of the old British Association of Gas Managers almost at its inception, and subsequently to the present of the corporate bodies that have sprung from it, as well as of the Midland Association of Gas Managers, his professional friends old and new were to be found throughout the length and breadth of the country. Though unobtrusive in person and opinion, but a constant attendant at meetings, in the proceedings at which he took a keen interest (even up to the recent meeting of the Midland Association), he had long been held in the highest respect; and where one has been accustomed to see him, his presence will be missed. It is supposed that a cold contracted while attending a friend's funeral on the 4th inst. was the beginning of the illness that had its fatal termination on Sunday evening. The news only came to hand as we were preparing for press yesterday; and therefore a more extended account of Alderman Annan's career must be reserved for next week.

PERSONAL.

Mr. J. L. Fletcher, who has for some years been Secretary of the Sunbury Gas Company, has resigned the position.

According to an announcement which appears in another part of the "Journal," there will shortly be a change of Gas Managers at Coleraine; and we learn from a local paper that it is caused by Mr. S. B. Langlands being about to leave to take an appointment under the Glasgow Corporation. The official intimation was made to the Urban District Council last Monday; but friends were cognizant of it about a fortnight ago. Mr. Langlands has been at Coleraine rather more than seven years.

We learn that Mr. C. Crowther Smith, F.C.I.S., is about to relinquish the position of Secretary to the Southampton Gas Company, after nearly forty years' service. He was appointed in the year 1865, and until 1896 he also held the position of Clerk to the Guardians of the Southampton Incorporation. Owing to his experience in rating matters, he was called upon, in conjunction with Sir George Livesey and Mr. H. E. Jones (as readers may remember), to give evidence before the Royal Commission on Local Taxation in 1897, when he suggested a simple method for the rating of public companies. Mr. Crowther Smith has been, from its formation, a member of the Council of the Gas Companies' Protection Association. We understand it is the intention of his Directors to elect him to a seat on the Board on his retirement from the office of Secretary.

ENTERPRISE OF A LEEDS ENGINEERING FIRM.

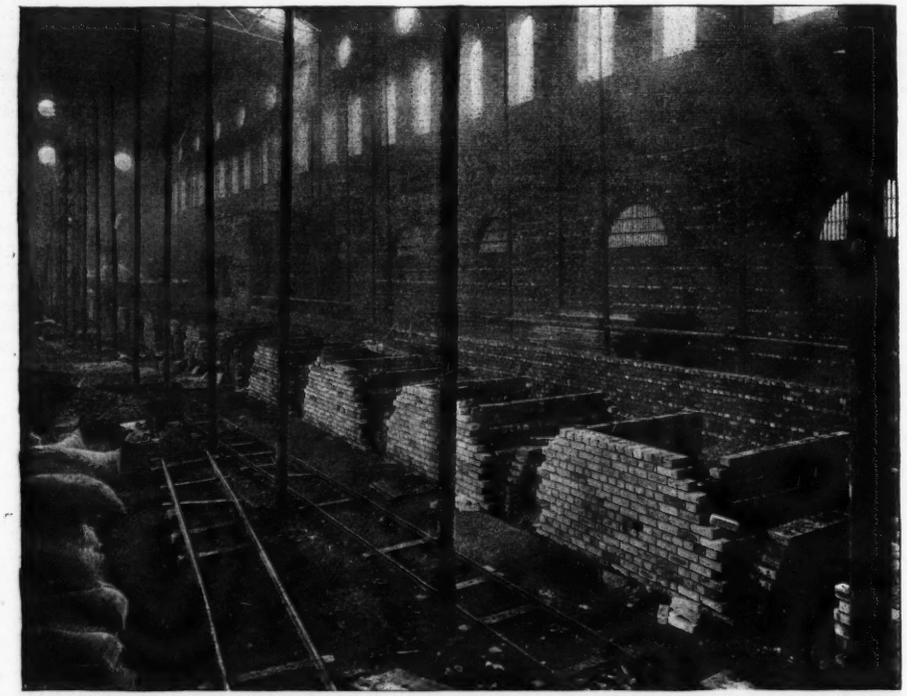
Pepper Road is not one of the most pleasing quarters of the great industrial city of Leeds; but it has lately acquired a new interest through the building and opening of the splendid, extensive, and replete works and offices of Messrs. Graham, Morton, and Co., Limited, in which works and offices are materialized all the ideas and characteristics—smartness, enterprise, and thoroughness—of the firm which have brought them into a prominent position in the front line of engineering within a remarkably short span of years. The head of the firm—Mr. Maurice Graham—whose name has been before the gas industry from the advent almost of the inclined retort in England, has obviously been irritated to the point of retaliation by the "gibes and sneers at Great Britain over 'obsolete business-methods' and 'antiquated' workshops and machinery." These "gibes and sneers" he has long held could not be safely applied directly to his firm; the insinuation being easy of repulse by their work at Edinburgh, Milan, and a hundred and more other places, in which initiative, systematic methods, and a scrupulous regard to the predetermining of detail have ended in the consummation of heavy contracts in record times. The value of the Edinburgh contract was £113,000, and of that for Milan £108,000. But all these creditable performances have now been eclipsed by what the firm have done, from their own designs and by their own workmen and tools, in erecting the new workshops and offices in the above-mentioned Pepper Road, which name appears to be particularly relevant to the achievement there of the firm. This achievement—from foundations to completion occupying only five-and-a-half months—is undoubtedly an excellent answer by an engineer to those writers in the British and American press who have dared to malign the methods and modernness of equipment of engineering in this country. And besides speedy construction, the works are an embodiment of the economic and other advantages of steel structural work for manufactories.

In order that due recognition should be made of these various facts, Messrs. Graham, Morton, and Co. took the opportunity offered by a visit last Friday of a number of gas, electrical, colliery, and general engineers to the works, to invite several Press representatives to see and witness for themselves. All told, the visitors numbered some 130; and they were made welcome by the head of the firm, at a luncheon in a marquee on the works. Then followed the inspection—first of the offices and then of the works. An account of what was seen is uncalled for here, as a descriptive article specially prepared in anticipation of this visit by "James Cassidy" is published elsewhere in this issue. It may, however, be said that to the visitor the surprising rapidity of construction that has been referred to is matched by the interest which the works and offices arouse by the completeness of their design to meet the requirements of system and order and speedy execution from the firm's letter-box to the end of a contract. Enterprise and breadth of thought and view are marked everywhere. Yet simultaneously with this erection, the firm were also devoting attention to the carrying out of a large contract for inclined retorts near Paris, to the value of £50,000.

In passing through the huge shops, the visitors were able to learn by simple observation that the range of engineering work into which the firm enter is a wide one. Big as are their contracts for carbonizing and conveying plant for gas-works, they would not suffice to keep the works, with the large staff of departmental officials and assistants, draughtsmen, and workmen, occupied. Elevating and conveying plants for all kinds of other purposes, steel structures for boiler and power houses and other uses, several bridges, screening plants, and even a lighthouse are among the contracts now receiving attention in the drawing office or in the shops—the separate contracts (large and small) now going forward numbering at least 40. Such a variety of work, without the superior claims of both offices and works, would have been sufficient to maintain the interest of the visitors on Friday. To their congratulations on the prosperity that has rewarded the firm's enterprise and on their noteworthy performances at the new works and elsewhere, we can sincerely add our own, together with the wish that success will continue to attend them in their new establishment.

A NEW INCLINED RETORT INSTALLATION AT LEEDS.

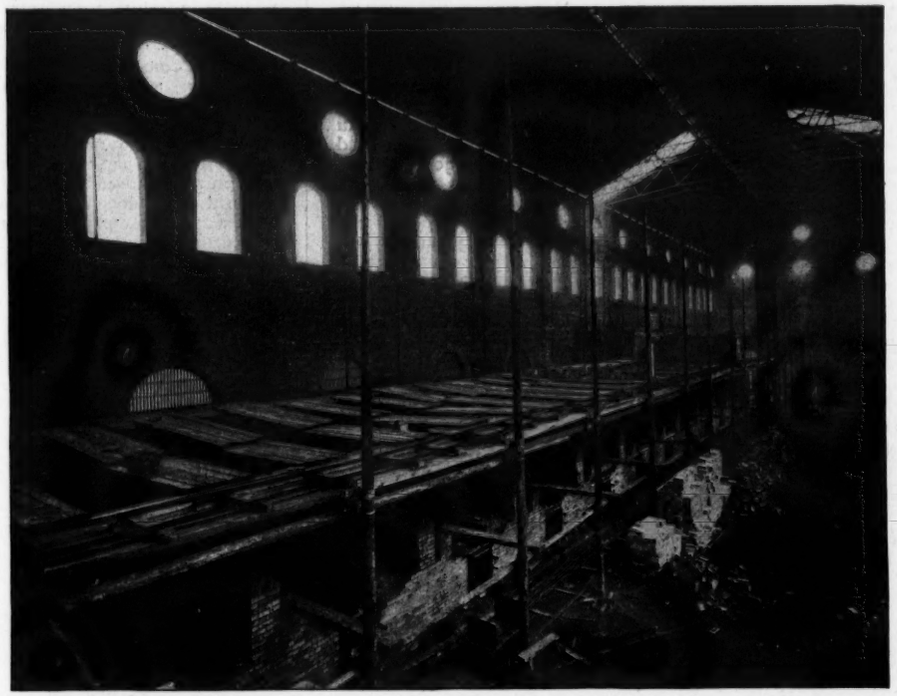
The party appeared distinctly loth to leave the busy works at Hunslet, in which there was so much to be seen and learned, in order to complete the programme which had been arranged for the day; but eventually the main body found themselves seated in two of the comfortable electric cars of the Corporation which had been specially chartered for their conveyance to the New Wortley Gas-Works. This last item had been included by the kindly consent of the Leeds Corporation Gas Committee; and the large company, or those of them who were interested in engineering and cognate matters, were not by any means disappointed with what was there to be seen in the way of new work. Alderman J. Lowden, the Chairman of the Gas Committee, Mr. R. H. Townsley, the Chief Engineer and General Manager, Mr. J. Bond, the Manager of the New Wortley works (who will soon be moving to his new position at Southport), and Mr. W. E. Pettigrew, the Manager of the York Street works, were there to give the visitors



THE NEW INCLINED RETORT INSTALLATION AT LEEDS—PHOTOGRAPHS TAKEN MARCH 4.

an informal but most hearty reception, and independent information on all and every point suggested by the inspection. The primary object of this last event in the day's arrangements was to give the visitors an opportunity of seeing the work in progress in connection with a fine large inclined retort-house which Messrs. Graham, Morton, and Co. are equipping. What the firm are able to accomplish at their own works in the way of speedy construction, they are—Edinburgh, Milan, and other places, and now Leeds testify—able to do away from home, whether near or far. They were not, however, in this case the contractors for the building itself, which seen at the present time, before the stages are inserted, impresses one as being, on all points, of remarkably good design for the special purpose. There is nothing about the building which is unnecessary, which is another way of saying that economy is written large on its face; at the same time strength has not been permitted to suffer by any economical considerations. The experience, too, with inclines at Meadow Lane and York Street has, in the plans, led to a generous regard for ventilation and light; and one has a feeling, looking at the house in its present state, that, when it is inspected on work being eventually in full swing there, it will be found that even the temperature of the charging-floor will not be an uncomfortable one for men accustomed to retort-house work. The dimensions of the house are 290 ft. long by 70 ft. wide; and it is throughout built of red brick.

This installation of inclines is not what can be exactly described as an extension of plant, as it really replaces two old horizontal hand-worked houses that have been dismantled. It really has for its end the supplanting of uneconomical by economical production, and securing a larger yield of gas per mouthpiece. In determining upon an inclined retort installation, the Committee and Mr. Townsley have relied entirely on their own experiences. They have within their works all the well-tried systems of operation. Hand-stoked horizontals are even now there; but they are marked for complete effacement as opportunity offers. This house abolishes them altogether from New Wortley. Some years ago, there was nothing but hand stoking at these works. On the completion of the new house, the station will be capable of sending out 8 million cubic feet of gas a day, produced entirely by inclined retorts and horizontal ones dealt with by West and Arrol-Foulis machinery. At other stations, too, there are installations of horizontals, with similar power charging and drawing machines; and at Meadow Lane there is the large inclined retort installation which we described some years since, while York Street has in the meantime had twelve beds of eights put in. In the two old hand-stoked houses at New Wortley, the yield has been about 6000 cubic feet per mouthpiece; while by the inclined retorts at Meadow Lane and York Street, it is about 7000 cubic feet. So that taking it that the new settings now being constructed at New Wortley will produce the same quantity, it is found that the house will have a capacity of something like 2½ millions. Here—in this increased production per mouthpiece—is one of the advantages the Committee are going to realize by the displacement of the old by the new. Another benefit will be this: The labour expense of working the old houses has been equal to 3s. 3d. per ton of coal carbonized, while in the new house—based on the years of experience at the other stations—carbonization will be carried on, from (as Mr. Townsley puts it) coal delivery to the coke stack, at 1s. 4d. Still another step forward in economy is this: That the old, hand-worked houses only gave for sale 8 cwt. of coke per ton



THE NEW INCLINED RETORT INSTALLATION AT LEEDS—PHOTOGRAPHS TAKEN MARCH 10.

of coal; while from the inclined installations at the two other works, the coke for sale equals 11 cwt. Here again there is a clear saving of 3 cwt. of material for profitable disposal. On these facts, it will be a matter for wonder if, even in critical Leeds, there will be any questioning of the policy of the Gas Committee and their adviser in clearing away as fast as circumstances will admit the old, wasteful method of making gas.

The system and order which pervade the Contractors' works at Hunslet, and the forethought bestowed upon the most minute details, are also the secrets of the rapid construction upon which the firm pride themselves; and the same method, too, ensures that the rapidity shall not affect soundness. At New Wortley, the visitors were invited to see the work as it is being executed, and to examine as they pleased the quality of that already finished. The engineers present did this to their full satisfaction. It was seen that 22 beds of eight inclined retorts are being constructed in two benches; and the information was given that the contract includes furnaces, settings, main flues, superstructure, stages, staircases, coal-hoppers, bench mountings and fittings, and conveying machinery complete. In bold characters, the date when the work was started is painted on a board; and kept prominently before the men, who apparently take a delight in bringing honour upon the firm, and through the firm upon themselves, for smart performance. It is seen that the bench-work was only started on Feb. 22; and yet there is not much more to be done before the arches of one bench will be turned. And not only that, but the brickwork of the other eleven settings on Friday was nearly up to the top of the main flue, which has been completed the entire length of the house. There is a great saving in time and labour by the system adopted for handling the bricks and other material. The scaffolding is carried up along one bench, and while the bricklaying is proceeding there, the scaffolding is being prepared for the continuation of the work on the other bench. Midway in the scaffolding is a steam-hoist, for raising the bricks and material. The bricks are placed on trolleys (say, 100 on each), raised by the hoist to the platform, and run along rails to the points at which they are required. Despatch is secured; and the men have always a good stock of material at hand to deal with. Notwithstanding the notable advance of the work in the eighteen days preceding the inspection, it was gathered that in the first week there were only twelve men engaged on the job, and twenty-two since. While speaking of the brickwork, there is a feature in it which should not be overlooked. In the ash-pans of the furnaces it was observed that there are three or four courses all round of the bricks made from spent lime and clinker, under the patents of Alderman Lowden and Mr. Bond; and it will be a matter of more than passing interest to see how the bricks will stand the high temperature to which they will be exposed. Their solidity and great strength lead to high expectations in this regard. Apart from this, they look like introducing another material economy for gas-works where spent lime is produced. At New Wortley, it costs something like 3s. per ton to dispose of the spent lime; by Alderman Lowden and Mr. Bond's plan, this waste material is profitably utilized. Without taking credit for the expense of removing the spent lime, it is found that the bricks can be made for from 9s. 6d. to 10s. per 1000. Opportunity was taken by those present on Friday to inspect the brick-making plant; and the interested party gathered some useful particulars both as to methods and quality of production. All this, however, may be left for special treatment in a future issue—more especially as certain improvements

have been made which have considerably enhanced the character of the bricks, but which, for the moment, cannot well be dealt with in the interests of the inventors.*

Of course, the work is not far enough advanced for us to publish a complete description of the inclined retort installation; but our information enables a clear indication being given as to the choice of the Engineer in the matter of constructional parts and details. The settings themselves will be on much the same principle as those which Messrs. Graham, Morton, and Co. have erected at Granton and Milan. The 22 archways of the benches will be placed at an angle of 32° to the horizontal, with 1 ft. 6 in. walls and piers; the division walls being 11 ft. 6 in. centres by 17 ft. 1 in. wide on the horizontal. At the top and bottom of the arches a channel iron is to be built in, 6 in. by 3 in. by 11 ft. 6 in. long. These irons will be held in position by the buckstays, and form a support for the arches. The furnaces are similar to those adopted at the Meadow Lane station. The retorts will be 20 feet long, and made in three lengths. They will have a uniform taper on the sides; their cross section being 24 in. by 15 in. at the bottom, tapering to 20 in. by 15 in. at top, and parallel top and bottom throughout. The top mouthpiece will be 20 in. by 15 in. by 3 in. deep, ⊓ shaped; and the bottom ones 24¼ in. at the back, tapering to 25¼ in. at front by 17½ in. by 16 in. The ascension, bridge, and dip pipes will all be 7 inches diameter. The hydraulic mains will be constructed in 22 separate lengths, each 2 ft. 6 in wide by 1 ft. 8 in. deep. Each main will be fitted with an improved hydraulic regulating seat valve, with 8 in. by 14 in. openings. The steel foul main will be in two lengths; the whole built up of 22 lengths of 24 inches diameter and 11 ft. 6 in. long. For this $\frac{3}{16}$-inch steel sheet is to be used.

Regarding the bracing and superstructure, there will be 24 16 in. by 6 in. by 62 lbs. H steel buckstays for the front of the division and end walls. The back buckstays will be similar in number and size, and will be fixed at a distance of 11 ft. 6 in. centres of beds and end walls. The end buckstays will number 16, and will be composed of 16 in. by 6 in. by 62 lbs. rolled steel joists. The cross stays and main and vertical stiffeners will all be of substantial section; while the transverse and longitudinal tie-rods will be of 2¼ inches diameter. Of transverse tie-girders, main transverse girders, and secondary transverse girders, there will be 24 of each. The first will be of 8 in. by 6 in. H steel, and about 19 ft. 3 in. long; the second, of 12 in. by 6 in. 45 lbs. steel; and the third, 8 in. by 4 in. H steel, about 19 ft. 1 in. long. The main longitudinal joists will consist of four complete lengths, 8 in. by 4 in. H steel; each length measuring about 156 feet. Of like length and number will be the secondary longitudinal joists, but of 6 in. by 3 in. H steel. Support will be given by these to the coal measuring-chambers. At the centre of the house, the two end front buckstays will be of the same length as for the charging side; and two 12 in. by 6 in. joists (which will support the hoppers) will be carried forward, and supported on the extension of the buckstays. Provision has been made for four complete sets of three charging-shoots. There will be altogether 66 coal-measuring chambers each fitted with double slide and levers, and of a depth of 5 ft. 8 in. and a width of 1 ft. 6 in. The lower part of each chamber is to be fitted with Graham's patent "sure-feed." The two coal storage hoppers will be continuous; each being arranged in eleven bays, 11 ft. 6 in. centres, 8 ft. wide, and 8 ft. deep over all. A suitable gangway will be attached to these hoppers.

As to the drawing and charging stages, the former will be constructed of 24 main girders, 12 in. by 6 in. by 54 lbs. H steel, about 20 feet long. At one end these will be attached to the front buckstays, and at the other to cast-iron supporting columns. These columns will be 8 inches outside diameter at the bottom, tapering to 7 inches at the top, with bases 1 foot square and of 1 inch metal. The body of the columns will be ¾-inch metal. The outer edging of the stage will be formed of 22 channel steel girders 10 in. by 4 in. by 27·4 lbs.; and there will also be 66 longitudinal girders 6 in. by 4½ in. by 20 lbs. H steel, and about 11 ft. 6 in. long. It may be mentioned here that coke shields and shoots similar to those in use at the Meadow Lane works are to be provided. For the charging-stage, the main transverse girders will be similar to those for the drawing-stage, and be bolted to the buckstays at one end and built into the wall at the other. In this floor about 88 longitudinal girders 6 in. by 5 in. by 29 lbs. H steel, and about 11 ft. 6 in. long, will be required. The floors will be covered with iron plates, with raised patterned surfaces. There will be two staircases to the drawing-floor, two the charging-stage, and two to the gangway along the overhead hoppers.

The coal handling plant will be in duplicate; and each set will be capable of handling 40 tons of coal an hour. The two receiving-hoppers will each be about 8 feet square and 5 feet deep. Under each is to be fitted a jigger-feeder, consisting of a steel tray, provided with taper screen bars pitched 2 inches apart, so as to screen the coal which must be bye-passed into the elevator boot without going through the crusher. The coal and cannel breakers are to be of the revolving type, with strong massive cast steel claws, 18 inches diameter, on the top shafts, and point and ratchet toothed rollers 16 inches diameter on the bottom shafts. The coal will be raised by a 24-inch twin cased-in elevator, about 80 feet centres, built up in a single frame, with division-plate. Each elevator will be provided with a double strand of 6-inch pitch steel roller chain, to which will be attached the 24-inch wide riveted steel buckets, pitched 20 inches apart. The angle-iron runners will be provided with renewable iron skidder-bars. The elevators will deliver on to four 20-inch push-plate conveyors, each about 135 feet centres with double-strand steel chain 6 inches apart. The push-plates are to be of $\frac{3}{16}$ inch steel plate, provided with an angle-iron skidder bar fitted to the two chains 24 inches apart. It is specified that the chain is to stand a strain of 10 tons. The troughs and other parts are of ordinary character. From the elevator to the push-plate conveyors, there is to be provided a double breeches shoot, so that the coal may be delivered from either elevator into any of the conveyors. All the necessary gantries and other conveniences will be provided for giving access to the overhead coal plant. It is intended to drive the coal plant by gas-engines.

This, without going into greater detail, indicates the character of the plant which will, at the rate of progress being made with the work, soon occupy the new house at New Wortley. Both the retort-settings, and the constructional speed-methods adopted by the Contractors, interested considerably those who were privileged to examine the one and witness the other on Friday. Latter-day construction in gas-works seems to be putting to rout altogether the comfortable old-fashioned systems of doing things that prevailed not a great many years ago; it being recognized by Messrs. Graham, Morton, and Co., among others, that in gas-works, as well as in their own works, "time is money." When new work is put in hand, the sooner the disorganization occasioned by the presence of the contractors' workmen is ended, the quicker is order restored, and work resumes its normal course without interruption. Time lost and extra labour incidental to the progress of new work are represented by money; and therefore welcome must be given to all efforts that are made by contractors to give to those they serve excellent work in the briefest space of time Although there were no formal thanks to Alderman Lowden, Mr. Townsley, and his colleagues on Friday, acknowledgments were personally made for the pleasure they had, both by permitting the visit and by their presence, given to the numerous guests of the Contractors.

* The earlier patent was described and illustrated in the "JOURNAL" for the 1st inst., p. 565.

THE RELATIVE PROPORTIONS IN WHICH GAS IS AT PRESENT APPLIED TO DIFFERENT USES.

Heer W. Niermeijer, the Manager of the Arnhem (Holland) Gas-Works, has written a report, which is published in the Dutch journal "Het Gas," dealing with the complaints that have been made at various sittings of the Municipal Council of the town respecting the gas supplied. He first points out the importance of a manufacturer knowing where and how his product is consumed, in order that he may be able to make any small alterations so as to adapt it to the uses required. In order in some degree to obtain this information, an examination was made in the summer of 1900 of the kind of burners and apparatus used by all the ordinary meter gas consumers. This examination was repeated last summer. A comparison of the two results was found to be very instructive. The statistics were collected according to streets and districts; and they show how novelties penetrate into the various sections of society.

The progress in incandescent lighting and gas-stoves is much greater in streets of shops and in middle-class neighbourhoods—which account for by far the largest consumers—than in streets inhabited by the upper classes. The following figures, in which slot meters are left out of account, will prove this better than anything else. The number of meters increased in the three years from 3683 to 4001, or by 8·7 per cent.; while the burners supplied by these meters increased from 41,864 to 46,981, or by 12 per cent. It follows, therefore, that the average burner capacity of the meters has become greater. This is the natural consequence of the increased consumption per consumer, due to gas being employed for other purposes besides lighting. In 1899, the consumption of gas per meter was 43,400 cubic feet, which had increased to 45,360 feet in 1902. The number of lights in use at one time was an important question, though less so for gas-works than for electricity supply stations. It was important for the gas-works that the proportions should be ascertained between the ordinary and incandescent burners alight at the same time, as compared with three years back. In 1900, there were 47 per cent. incandescent and 53 per cent. ordinary burners. Now there are 63 per cent. incandescent and 37 per cent. ordinary burners. These figures speak for themselves. The great increase in incandescent lights must result in the consumption per meter being less; and stoves, &c., must therefore compensate for the decline. In 1900, there were 850 gas-fires in use; now there are 1245, or an increase of 46 per cent. The number of gas-cookers rose from 2661 to 3400 (28 per cent.), and that of bath-heaters from 472 to 534 (13 per cent.).

The introduction of the incandescent light—in which another light-emitting material is substituted for the relatively expensive carbon particles—has made possible the use of the more cheaply produced water gas, or rather "coke gas." The higher flame temperature of this renders it more suitable than coal gas for incandescent burners, as it causes the mantles to glow more

brightly, and does not give rise to the deposits of lampblack which give so much trouble. It is now only a question whether the management of a gas-works is justified, for the sake of the users of incandescent burners, in making the gas of such poor "illuminating power," that other consumers are troubled by it. The figures given certainly show that 37 per cent. of the burners employed are ordinary self-luminous ones; but they also prove something else. Mention has been made of 1245 gas-fires, 3409 cookers, 534 bath-heaters, &c.; and therefore there was still to be ascertained what proportion of the gas is used for its "illuminating power"—or, in other words, what percentage of the consumption requires the presence of the expensive carbon particles in the flame.

To determine this point, two different periods were taken—one in winter, from Jan. 5 to 11, 1903; and the other in summer, from June 8 to 14, 1903. In the first period, 7,121,810 cubic feet of gas was distributed, 2,017,783 feet of which was by day and 5,104,027 feet by night. The 2,017,783 cubic feet of gas consumed by day required no lighting power. The 5,104,027 feet consumed at night was partly utilized in 19,778 burners in use by private consumers, simultaneously with 5175 burners employed by slot meter consumers and 1400 for public lighting. Of a total of 26,353, 19,131, or 73 per cent., were incandescent burners. And, further, there were 13,739 gas-cookers (including slot-meter supplies), 1245 gas-fires, and 534 bath water-heaters, which certainly to some extent also are in use at night, and are equivalent to about 35,000 burners. Therefore, if it is granted that of the 5,104,027 cubic feet of gas consumed by night a small part—viz., 868,027 cubic feet—is used for heating and cooking, there remains 4,236,000 cubic feet used for lighting. This lighting consists, as already stated, as to 73 per cent., of incandescent burners. Therefore, of the 4,236,000 cubic feet, 2,965,200 feet is used by incandescent and 1,270,800 cubic feet by ordinary burners. It is only the latter in which the relatively expensive carbon is of value—that is to say, in only some 18 per cent. of the total quantity of gas distributed.

The foregoing figures are included in the following table, which also gives the figures for the period from June 8 to 14, showing that 14 per cent. of the gas is consumed in ordinary self-luminous burners.

Jan. 5 to 11, 1903.

	Cubic Feet.
Total consumption—	
Night gas	5,104,027
Day "	2,017,783
	7,121,810
Night gas used for—	
Lighting	4,236,000
Heating	868,027
Total night gas	5,104,027
Lighting gas used in—	
Incandescent burners	2,965,200
Ordinary "	1,270,800 (= 18 per cent.)
Total lighting gas	4,236,000

June 8 to 14, 1903.

	Cubic Feet.
Total consumption—	
Night gas	1,653,063
Day "	1,931,193
	3,584,256
Night gas used for—	
Lighting	1,582,463
Heating	70,600
Total night gas	1,653,063
Lighting gas used in—	
Incandescent burners	1,059,000
Ordinary "	523,463 (= 14 per cent.)
Total lighting gas	1,582,463

There is therefore still an average of 16 per cent. of the gas appreciated according to its "illuminating power." In 1900, this figure was 24·4 per cent.; so that there is a great decrease. The 16 per cent. is used by persons who, in the main, are responsible for the complaints made. Is the management of the gas-works justified in making an expensive product and putting the Town Council to expense, for the benefit of those persons who adhere, through custom and tradition, to an old system of lighting?

Heer Goedhart, having asked at a sitting of the Town Council which ordinary burners were the best to use with a mixture of coal and water gas, a series of experiments was made with various burners, some with small and others with large orifices; and the results are shown in the annexed Table A. Mixing with air is one means of destroying the "illuminating power" of coal gas; and this principle is carried out, for example, in incandescent burners. This mixing takes place also more or less in ordinary burners. In batswing burners, there is in the centre a layer of gas, bounded on both sides by surfaces consisting of a mixture of gas and air, which burn together and supply heat to the central layer, for the dissociation of the illuminating carbon compounds. The carbon thereupon becomes incandescent, and consequently yields light. It is afterwards consumed, and then itself supplies heat for the dissociation of the gas which flows out somewhat later. If the slit is narrow, the central layer is thin. There is more opportunity for mixing with air, and therefore quicker combustion, and consequently less light. The same effect is seen with argand burners, Siemens's circular burners, and all other burners with chimneys. These burners consist of a ring of small holes, from which the gas issues. The illuminating portion is a large number of small columns of light, surrounded by the hot dissociating jacket. If the holes are very small, the light-columns are very thin, and there is thus little light (see Table A, which shows that the American governor burner with small holes has a lower efficiency than the same kind with larger holes).

TABLE A.

Kind of Burner.	Lighting Power in English Standard Candles.	Gas Consumption per Hour in Cubic Feet.	Candles per Cubic Foot.
Steel slit, narrow	4·2	3·74	1·12
" " wide	9 5	5·16	1·84
Steel fishtail, narrow	6·4	4·52	1·42
" " wide	7·2	4 73	1·52
Bray's patent enamel regulator—			
No. 1	1·0	2·72	0·37
No. 3	1·7	3·11	0 55
Bray's regulator No. 2	1·0	2·90	0·34
" " No. 5	4·2	3·78	1·11
" " No. 7	7·1	4·52	1·57
Bray's regulator market—			
No. 8	10·3	4·91	2·10
No. 11	14·2	6·04	2·35
American regulator, small holes—			
With chimney 25 cm. long	11·0	6·11	1·80
" " 20 "	13·2	6 11	2·16
" " 15 "	14·8	6·11	2·42
American governor, large holes—			
With chimney 25 cm. long	12·5	6·50	1·92
" " 20 "	15·0	6·50	2·31
" " 15 "	17·7	6·50	2·72
Siemens's ring-burner pattern—			
With chimney 25 cm. long	10 0	6·15	1·63
" " 20 "	12·0	6·15	1·95
" " 15 "	13·5	6·15	2·20
Incandescent burner	81·0	3·71	21·83
" "	41·0	2·30	17·83

Another means of governing the mixture in burners with a glass chimney is the length of the chimney, which acts as a shaft to draw up air for the combustion. If the chimney is long, much air is drawn up, and with a mixture of coal and water gas even too much. The tests in Table A, with various chimneys on the same burner indicate this clearly enough. The results with incandescent burners are also shown; and it will be seen that their illuminating duty is on an average ten times better. If the consumers of the 16 per cent. of gas in ordinary burners will not yet be convinced that incandescent lighting is better, they should be advised to use flat-flame burners with a wide slit, and be careful that the flame burns steadily and does not roar, as this is a sign that the gas is issuing too fast and is carrying too much air with it. The chimneys used should be as short as possible; care being taken that the flame does not come above the glass, and that the products of combustion do not impinge directly on ceiling protectors, &c. There remains the question whether a mixture of coal and water gas is unsuitable for heating purposes. Every day the gas has been tested for calorific power; and it has always been found to yield the 560 B.T.U. per cubic foot, which is looked upon as essential to good gas. In October, the average was over 568 B.T.U., and in November 567 B.T.U. per cubic foot. Here, again, figures teach us that public opinion judges wrongly. In the following table is given the quantity of water gas added during various periods to the product, and the increase in gas consumption.

1902.	Added Water Gas, Per Cent.	Increase in Consumption. Per Cent.	1903.	Added Water Gas Per Cent.	Increase in Consumption. Per Cent.
May	19	6·44	Jan.	15	9·35
June	9	5·80	Feb.	17	9·00
July	19	9·62	March	17	7 63
Aug.	19	10·40	April	16	9 00
Sept.	13	12·40	May	16	9 37
Oct.	nil	10·90	June	nil	8·58
Nov.	"	10·00	July	"	8·85
Dec.	7·5	11·00	Aug.	"	7 00
			Sept.	"	4·20
			Oct.	15	2·33

From this, it appears that no connection can be found between the quantity of added water gas and the increase in consumption. Taking the mean of the figures, an increase of 8·2 per cent. is found when no water gas is added, and of 8·5 per cent. in a mixture with 15 per cent. of water gas.

If the mixed gas really had a bad effect on the use of gas for cooking and heating, the slot-meter consumers, who relatively use the most gas for cooking, must have noticed it. The list below gives the consumption per slot meter per month in 1901,

before any water gas was made, and in 1902 when mixed gas was started, with a statement of the percentage of mixed gas.

	1901. Coal Gas. Cubic Feet.	1902. Mixed Gas. Cubic Feet.	Increase Per Cent.	Mixed Gas Per Cent.
Jan.	1123·59	1127·12	±0	—
Feb.	1144·42	1137·71	±0	—
March.	1357·63	1322·69	−3	—
April	1194·90	1206·90	+1	10
May	1239·73	1180·78	−5	19
June	1275·03	1221·02	−4	9
July	1318·10	1345·98	+2	19
Aug.	1356·93	1402·11	+3	19
Sept.	1521·43	1522·13	±0	13
Oct.	1410·23	1433·23	+2	—
Nov.	1389·76	1448·00	+4	—
Dec.	1577·55	1615·68	+2	7·5
	15,909·30	15,963·35	+0·3	8

Here, also, no connection can be traced; and it appears conclusively from these data that mixed gas can satisfactorily answer the requirements as to heating power. But why, then, do complaints arise? This question can also be satisfactorily answered. Many complaints date from the time before any water gas was made, and gas consumers had only heard water gas given a bad name. One would say: "My gas-stoves yield much more water than formerly; that is from the water gas!" Another said: "They purposely add water to make the wet meters register more!" Yet another had bad gas at his house, but very good at his office! It must be at once admitted that the so-called reflector stoves give less heat with mixed gas, as these stoves act on the principle that the heating effect is partly due to the heat given out by the incandescent particles of carbon. Consequently, if the flames are less highly luminous, the reflecting power is less, and the stove loses a part of its efficiency. But Clamond has now made the glowing particles of carbon in the reflector stoves a superfluity, by replacing them by very strong porcelain mantles, which can be easily changed and give out a great deal of heat. A solution of this difficulty has thus been found.

The public generally believe that, by using gas-fires, they are doing the gas-works a favour. Nothing is furthur from the truth. Every endeavour is made to avoid the injurious inequalities in the operation of a gas-works in winter and summer. Arnhem has spent a lot of money on slot meters, principally to obtain summer consumers, or, in any case, consumers who use about equal quantities in winter and summer. The encouragement of consumption in gas-fires works just the opposite way. If the patrons of gas-fires imagine that all heating should take place from one central station—in this case the gas-works—Arnhem would require a works of infinitely greater capacity than at present. Such a works would then be driven hard in cold winters, while in mild winters they would not reach the full productive power. In summer they would not supply much more gas than at present. From an economical standpoint, this would not be a very desirable condition of things.

Further, some consumers complain of bad light. The mantles were bad, not only in themselves, but also in the manner they had been treated. In general none of the so-called hardened mantles should be purchased. Numerous trials have been made with hardened mantles for public lighting. The results have been distinctly unfavourable; and if this is the case in professional hands, they would not be likely to succeed better with private individuals. Mantles should not be bought at general shops, but good gas-fitters should be employed; and only self-incinerated mantles should be used. They are dearer, but better.

The laying of service-pipes and their maintenance, as well as the treatment of the incandescent light, leaves much to be desired, resulting from the fact that all private fitters are not well up in their business. Herein lies the reason of many complaints. If the light is not good, and the private fitter does not see at once the means of remedying it, the gas-works are blamed. But it is really only the fault of the works if the service-pipe has become blocked outside the house. It often happens that the pipes inside the house no longer suffice for the many burners and other apparatus connected in the course of time. The gas-works fit a small attachment immediately after the meter, so that the private fitter can at once ascertain if there is sufficient pressure beyond that point; but as a rule he does not do so. There is not enough gas; and therefore it is the fault of the works, and their staff is called in. The question has often arisen whether it is not desirable or even necessary for gas-works to undertake private gas-fitting; but there are difficulties in thus interfering with private trade. The knowledge that, in order to retain their customers, they must serve them well, should be a sufficient incentive to private fitters to be better equipped than they now are.

The reasons for introducing mixed gas may now be considered. In the first place, a reserve in the winter months was necessary in order to defer the building of a new and costly retort-house, and so gain time in order to see if the increase in gas-consumption was really maintained. This knowledge has now been obtained, and a considerable extension of the productive capacity will soon be planned. In the experiments with mixed gas, it was found that, as in other countries, this gas could be adopted with financial advantage without injuring the consumers. Economically, it appeared desirable to make mixed gas the whole year through, as by this not only is the sale of coke facilitated but water gas is much cheaper than coal gas. For example, in January, February, March, April, and May, 1903, there was made 112,473,990 cubic feet of coal gas, to which was added 21,142,370 feet of water gas, or 16 per cent. Water gas cost at that time rather less than half as much as coal gas, and afforded in the five months a saving of about £550.

There is finally one complaint to be answered; and it was the only one emanating from the Town Council themselves—viz., as to the high percentage of sulphur. In the years 1899, 1900, 1901, and 1902, the average of sulphur in the gas had fallen to 15·7, 14·9, 10·8, and 10·1 grains per 100 cubic feet. This year the figures were higher, owing to trials with new sorts of coal. The Boldon coal, which answered well the previous two years, this year contained more sulphur. It requires, however, no special art to maintain a low percentage of sulphur. If the management is careful not to raise the yield of gas per ton of coal carbonized too high, and only to use clean, but expensive, coals, there is no difficulty in doing so; but the profit at the end of the year would be considerably lower.

An appendix to the report shows the composition of the mixture of coal used each month, and the sulphur figures relating to it. It indicates that the Wearmouth, Thornley, and New Pelton kinds had a very unfavourable influence, while the Boldon coals were becoming worse. Whenever Mickley coals were worked, it was known at once that the sulphur figures would go down.

It must be borne in mind that the new purifying house at Arnhem will bring no improvement in this respect. The gas has been always free from sulphuretted hydrogen, and more cannot be done, with the usual mode of working. The other compounds of sulphur can only be got rid of by very costly appliances and manipulation. Even in England, whence the notorious maximum of 22 grains per 100 cubic feet emanated, attempts are being made to secure the abolition of any restriction on the amount of sulphur other than sulphuretted hydrogen in the gas. And it must be remembered that gas-works in England, using almost exclusively English coals, have more to fear from sulphur in the gas than those using other coals. That they do not object to the sulphur in other towns in Holland, is shown by the following figures.

Sulphur in the Gas Distributed.

	Grains per 100 Cubic Feet.		
	Average for 1902.	Lowest.	Highest.
Amsterdam	24·3	17·1	30·6
Rotterdam	*	*	*
The Hague	*	*	*
Utrecht	27·1	22·7	31·9
Groningen	20·7	12·0	34·7
Leiden	21·5	9·2	31·6

* Free from sulphuretted hydrogen.

LAYING GAS-MAINS UNDER RIVERS.

By H. C. Morris, of Bay State (Mich.).

[A Paper read before the Michigan Gas Association.]

In 1901, after the consolidation of the Gas Companies of East and West Saginaw, it was found that the cost of operation could be greatly reduced by the abandonment of one plant and the enlargement of the other, so as to have one plant of sufficient capacity to take care of the demands of both the east and west sides of the city. In view of the fact that the plant in West Saginaw was of old construction, lacking in proper facilities for saving residuals—tar, ammonia, &c.—and only of a capacity sufficient to supply the demands made upon it at the time, it was decided that the west-side plant should be abandoned, and the consumers in that section of the city supplied by the east-side plant, which was of more modern construction and of greater capacity.

Since the two sides of the city are separated by a river, in order to supply the west-side consumers from the gas-works on the east side, a line to be laid on the bed of the river, or a line across one of the numerous bridges, was considered. The latter was feasible, but not practical for several reasons. In the first place, it would have been necessary to maintain a gasholder on the west side, in order to have a constant pressure, all the bridges being swing-bridges, and liable to be opened at any time; secondly, it would have been necessary to have men stationed on the bridge selected 24 hours a day during the navigation season, to open and close valves on the bridge proper, and also on the bridge swing; and, thirdly, it would also have been necessary to use specially adapted sleeves on a bridge-line at each end of the swing, which necessarily would have to be connected and disconnected every time the bridge was swung. So the more practical alternative was adopted—*i.e.*, laying a 12-inch low-pressure line on the river bottom. This was more expensive in first cost than a bridge-line, but ultimately it would cost less to operate and maintain. The pipe decided upon was the standard 12-inch, with threads and couplings.

The width of the river at the point chosen for laying the line is

1500 feet. About 200 feet of this is a bayou, approximately 14 feet deep, with a middle ground or island about 125 feet in width, and about 2 feet above the city datum line or normal level of the river. The rest of the distance is a ship channel varying in depth from 8 to 14 feet. There was sheet piling along either shore; and it was necessary to have these piles drawn before starting work.

The general scheme in the first attempt to lay a pipe-line was to make up the lengths of pipe on the middle ground, and after plugging the end of the length first entering the water, float it across the river. The floating of the line was possible, since the plugged pipe, when floating, had an excess buoyancy of approximately 8·16 lbs. per foot over its sinking weight. The line being a low-pressure one, it necessarily had to be laid with a fall, in order to take care of condensation or whatever water might leak into it. Therefore, considerable dredging had to be done, not only to get a proper fall, but also to get the line deep enough in the ship channel to conform to any possible change in depth in the channel that might be made necessary by future navigation. This depth was made 16 feet, which was approved by the United States Government.

The first attempt to lay the line was made in October, 1901; and the work at that time was under the supervision of a mechanical and civil engineer employed for the purpose. The attempt was a failure, and the loss of money great. This failure can be accounted for by the fact that no strengthening sleeves of any kind were used over the pipe couplings, no systematic soundings of the river bottom taken after the dredging had been done, and no other method adopted to keep the pipe in the channel dredged for it when it was being lowered into place, than pieces of 4 in. by 4 in. timber in lieu of piles driven for this purpose at intervals from shore to shore. These timbers were too light for the work required, with the result that when the whole line was lowered, a strain was placed upon the pipe at the couplings, and a greater strain upon certain couplings which were in the part of the line afterwards found to be out of the proper channel. Odd lengths of railroad iron and large pieces of limestone saddled together with pieces of wire were used as weights to sink the pipe; and as there was nothing to hold the pipe to the surface of the water until these weights or ballasts had been evenly distributed along its entire length, the pipe went down very unevenly. This in itself did much towards straining the pipes at the points where the threads entered the couplings.

After the pipe had been lowered in the manner stated, the Engineer had the line filled with water, as he said, "to settle same." This was all very well until the time came to pump out the water, which it was found impossible to do. The next thing to be done, of course, was to try to locate the leak, or to ascertain the reason why it was not possible to empty the water from the line. This was done by a compressed air connection at the shore end. By this method it was shown that the line was leaking at four or five different places. Marine divers were then secured; and their examination demonstrated that it would be impossible to repair the breaks with river sleeves, and that it would be necessary to take up the line. The raising of the pipe was begun four or five lengths at a time, and the work made comparatively easy by means of a lighter. The pipe was taken to shore and disconnected. This operation was continued until all the pipe was again placed on shore.

The season was now well advanced to the end of November, with ice forming in the river, making it practically impossible to continue work. Operations were therefore abandoned for the time being, with the lesson well learned that experience is the greatest of all teachers. During the winter months that followed we had plenty of time to think over our expensive experience, and weigh well our intentions before again starting on the work. Of two things we were sure—no more so-called "expert engineers," and no pipe laid without strengthening sleeves fitted round the couplings.

The following spring, the 12-inch pipe that had been used in the previous attempt was taken to a machine shop and re-threaded—the threads having been damaged in the previous lowering of the line. New couplings were secured, and protecting sleeves made to clamp over the pipe at each joint. These protecting sleeves were made similar to a splint sleeve used for repairing ordinary gas-mains, with the exception that a recess was formed in the centre of the sleeve, in order that it should clamp round the pipe and clear the coupling. The sleeves were made of ¾-inch cast iron, weighed approximately 300 lbs., and were bored for five ¾-inch bolts on either side. The sleeve was 22 inches long.

The pipe and protecting sleeves were taken across the bayou to the middle ground, and as the pipe could all be made up at practically one point, a small boiler and hoisting-engine were procured and set up on the middle ground to be used in screwing up the pipe. A compressed-air pump was also placed on the middle ground, and used to test the line as it was made up. A heavy pipe-tong about 8 feet long was made by using a piece of oak and a piece of chain about 12 feet long. The chain was bolted into the oak stick about 8 inches from the end, and the tong was used by wrapping the chain round the pipe, and running a rope from the end of the tong to the drum of the hoisting-engine. By the use of this apparatus, the jerk and jar of screwing up the pipe, as with ordinary tongs, were avoided.

While the pipes, sleeves, tools, and other materials, were being collected on the middle ground, dredging was being done. Guides for the dredging had been made by driving numbered pieces of 4 in. by 4 in. timber, 50 feet apart, at intervals across the river. The dredge engineer was furnished with a chart showing the depths wanted opposite these guides. The dredging was accomplished with fair results by graduating in feet and half feet the dipper arm on the dredge. The dredge man was checked after every move ahead. The only error that was made in the dredging was in keeping the depth too near that required, instead of having it 1 foot or 1 ft. 6 in. deeper, as will be shown hereafter. In the channel the dirt brought up by the dredge was taken away on dump scows. The cut made by the dredge was from 7 to 9 feet wide; this width being necessary to prevent the filling in again of the cut before the pipe could be lowered into it. After the dredge had advanced far enough from the shore, a pile-driver was started, driving piles in pairs 12 feet apart, the distance between the pairs averaging 60 or 70 feet. A bent was made by placing a piece of 6 in. by 6 in. timber across the piles, held in position by drift bolts. The 60 or 70 feet between the bents was ample space for all navigation.

By using protecting sleeves, it was found that each foot of pipe weighed approximately 6·84 lbs. more than the water displaced by it. Cedar poles were therefore rafted together near the middle ground for use in floating the pipe as it was made up. This was unnecessary the year before, as the pipe would float without any means other than keeping out the water. By way of explanation, it might be stated that about ten men were employed on the works—this number being required to handle the pipe, &c.; but on the last day, when the pipe was ready to be lowered, 22 or 23 men were engaged.

As soon as the first bent of piles had been driven, work was started making up the pipe; and the hoisting-engine was used to perfection in doing this work. As soon as several lengths of pipe were made up and the sleeves clamped over the couplings, the pipe was launched out. To avoid any possible danger from leakage, all pipe-threads were thoroughly coated with black manganese and shellac, and the face of each coupling caulked with yarn and red lead before applying the sleeve. Each section of pipe was lashed between two parallel cedar poles as it was launched out. This method was used until approximately 300 feet only of the river remained to be crossed. Of this space, 200 feet was in an old log boom on the west shore, and 100 feet in the main ship channel which was in daily use. It was found that it would be necessary to close the channel to navigation for at least one day; so, in order to save time, sections composed of two and three lengths of pipe were made up ready to screw into the line immediately after the closing of the channel. After these preparations had been made, notice was received that the channel could be conveniently closed to navigation on a certain day.

After the line had been made up in its entire length, and was about ready to be lowered, a rain storm came on, and the level of the river was raised at least 2 feet. This necessarily increased the current, and considerable sand and silt consequently washed into the cut that had been dredged for the pipe. In fact, a space of about 100 feet of the cut was in this way filled from 12 to 14 inches higher than the chart would permit, if the line was to be laid with the intended fall. The grade could not be varied, in view of the fact that this was to be a low-pressure river line, and would necessarily require a perfect fall from the middle ground to a drip at the west shore to provide for condensation and leakage. And inasmuch as the channel was practically closed, and it was impossible to use the dredge with the pipe on the surface of the water, it was decided to lower the line to the bottom, which would open up the ship channel again, and permit dredging to be done alongside of the line. This second cut was made by the dredge as close to the line as it was safe to work the dipper without striking the pipe. When the cut was of sufficient depth, the sand and silt under the pipe were washed into it by the current; thus allowing the line to settle to the depth desired.

The following method was used in lowering the line: As many measuring-sticks as there were bents of piles were graduated into feet and quarter feet. Two men were stationed at each bent of piles—one man to hold a measuring-stick on the top of the pipe as it was being lowered, the other to lower when the signals were given. One-inch rope was lashed to the 6 in. by 6 in. timber across the piles, and then passed under the pipe, and three or four wraps taken round the timber. The cedar floats were then removed, and this left the pipe suspended in the rope sling ready for lowering, which was regulated by signals given by the man in charge of the work. The pipe was lowered 6 inches at every signal. By watching the stick at each bent of piles after a lowering signal had been given, it could be seen that the line was being lowered to the same depth at all points, and no uneven strain put on any particular length. This operation was continued until the entire line was lowered to the depth required, when the ropes were lashed to the 6 in. by 6 in. timber and left until such time as filling could be dumped under the pipe where the dredging had been too deep. In this way it was possible to obtain a perfect fall.

Nothing now remained to be done but to make land connections at the gas-works on the east shore, and with the west-side trunk line on the west shore. A piece of 12-inch pipe was used for a drip-pot, and a common brass cylinder deep-well pump for the pump. The line was completed in July, 1902; and since that time no trouble has been experienced from the water, as the drips make approximately 2 gallons of water only per day, and the drip-pot will hold about 50 gallons.

In 1903 it was decided that another river line was required as an emergency line, to be used only in case of accident or during repairs on the old line. A 4-inch high-pressure line was regarded as of ample capacity for the purpose. The point selected for the laying of this line was about 500 feet above the 12-inch line—a distance considered sufficiently safe to avoid any possible accident to the old line on account of working on the new one. Then it was deemed well to have the two lines so far apart that any accident happening to one might not affect the other. At this location a navigable cut had been made through the middle ground by a lumber company in days gone by, and by using it some money could be saved in dredging.

For this line, extra heavy 4-inch line-pipe, threaded, but without couplings, was used, and a Dresser river sleeve for the joints. This sleeve is specially designed for use on river lines, and experience with several styles of sleeves demonstrated that preference should be given to it over the common screw-coupling with the split sleeve used for protection. It is made with the centre of the sleeve reduced and threaded so that the pipe can be screwed in as in any screw coupling. The ends of the sleeve are packed with V-shaped rubber rings, which positively stop whatever leakage might occur at the threads. The sleeve weighs 70 lbs., and serves as an anchor to hold the line on the bottom of the river.

A compressor with a 6-inch outlet was purchased and installed in the exhauster-room at the gas-works. This was one of the first things done, for we desired to use the compressor in testing the line as it was made up. A regulating station was employed to lower the pressure from 20 lbs. (the pressure maintained at the gas-works) to 30-10ths on the west side. In view of the fact that no decided grade was necessary for this line, the only dredging to be done was across the ship channel, where it was thought best to lay the line at a depth greater than any to which the channel might eventually be made.

An entirely different method from that used in laying the low-pressure 12-inch line was decided upon in laying the new line. A float about 12 ft. by 16 ft. was made of timbers, and on it the line was made up. After a length of pipe had been screwed up and the joint tested, the float would be pulled ahead, allowing the line to settle in the water. This operation was continued throughout the laying of the line. While the pipe was found to bend easily —that is to say, 2 or 3 feet in 100 feet—it was found necessary to bend some lengths at the blacksmith's to conform with any decided or sudden drop of the river bottom.

Only three or four piles were required in laying this line to keep the pipe in the cut dredged for it. These piles, with the aid of anchors, also served to hold the raft in place while screwing up the pipe. No fittings of any kind other than the sleeves were used on the line; the pipe being bent in all cases where a bend was necessary. About six men were required to lay the line, and one week's time was taken from the day when the work was started on the river until the line was completed. The connections on the west side were made by using a 12 in. by 6 in. split tee; the trunk line connected into being a 12-inch, and the outlet of the governor 6 inches.

There has, as yet, been no occasion to use the 4-inch line 24 hours through; but it has been employed from 10 to 14 hours to test the working of the governor on the west side, and also to ascertain the reliability of the compressor. On several occasions it has been shown that this 4-inch line does not leak, for after the compressor was started and the gauge on the line indicated 20 lbs. pressure, a valve at the inlet of the governor was opened, and no water was blown out.

With regard to operating, the only expense of the 12-inch line is the time required of a man twice a day to pump the drips. This daily pumping is not absolutely necessary, as the drips will hold enough water for almost a month's run; but, by way of precaution, it is considered safe and wise. The 4-inch line when in use requires the services of an engineer and steam to operate the compressor. So that while the first cost of a low-pressure line is greater than that of a high-pressure one, it is the operating factor that should be considered. For comparison, the cost of the two lines is given below; that of the low-pressure line being, of course, exclusive of the expense attending the first attempt and failure.

Low-Pressure (12-Inch) Line.		*High-Pressure (4-Inch) Line.*	
Pipe	$2946	Pipe	$845
Sleeves	304	Sleeves	280
Dredging	1546	Compressor	1139
Marine diver	164	Regulator station	200
Lighters and boats	899	Dredging	813
Sundries	1024	Sundries	279
Labour	1493	Labour	664
Total cost	$8376	Total cost	$4220

A HENNEBIQUE FERRO-CONCRETE RESERVOIR.

In the course of a paper containing an account of some works recently carried out in connection with the Penzance Water Supply, which was read at last week's meeting of the Society of Engineers, Mr. Frank Latham, the Borough Engineer and Surveyor, described a Hennebique ferro-concrete service tank which has been built there, and which has proved highly satisfactory. As this reservoir is stated to be the first of its kind to receive the approval of the Local Government Board, a few particulars regarding it may be of interest.

In the first place, the site selected afforded a precarious foundation, inasmuch as it was made-ground on a side-long formation, which also necessitated the greater part of one side of the tank being altogether out of the ground, while the back had to resist the thrust of the land. An iron-covered tank of 130,000 gallons capacity was at first considered best; but, as stated, it was finally decided that the Hennebique system would be perfectly adaptable to the circumstances of the case. The floor and roof of the tank consist of a succession of beams having two round steel bars at the bottom, two curved bars running through them, and hoop steel stirrups bent round the bottom rods and buried in the floor—all being encased in portland cement concrete built in moulds. A straight bar at the top of the beams was in this case also introduced. This acts as a compression member, and takes the place of a certain amount of concrete; and it is assisted by hoop steel fixed in a reverse direction to that already mentioned. The buttresses are formed of these beams placed vertically; and the walls between contain vertical and horizontal steel of sufficient strength to resist the pressure—the horizontal steel being placed closer together towards the bottom of the tank, where the pressure of water is greatest. All these steel rods were put in proper position before the concrete work was commenced. The columns supporting the roof consist of four vertical bars of steel, connected together by distance-pieces, and surrounded by concrete; and these columns, being under compression, are constructed with a greater proportion of concrete than steel. Much care was exercised that the steel at all corners and at the head of the columns should give the utmost strength possible, and that the concrete (which forms an essential part of the construction) should be of the best and most suitable quality.

With regard to the latter point, the author went to considerable trouble in obtaining the materials, as it seemed to him that, if there was any oozing of water through the exposed walls, this in time of frost would be detrimental, and possibly disastrous, to the construction. Besides this, it was his opinion that the steel contained in the walls should remain perfectly dry, and protected by the concrete from any elements that might create rust—not so much in anticipation of the weakening of the steel by waste, as because he believed that any expansion caused by rust would be harmful to the preservation of the tank. Though Mr. Latham had every faith in the construction, he was more than gratified to see in practice the remarkable cohesion of the steel rods and stirrups with the concreting materials. The tank, on examination three months after completion, did not show any trace of a crack or settlement; and the walls themselves were of a very impermeable nature. The internal surfaces of the walls were rendered absolutely water-tight by a coating of cement and sand, in the proportion of one of the former to two of the latter, ¾-inch thick; and all angles were rounded and rendered smooth.

In the subsequent discussion, a great many of the remarks of the different speakers were directed to this portion of the paper. First of all the Secretary (Mr. Perry F. Nursey) read a communication from Mr. A. R. Galbraith, in the course of which the writer remarked that the size and shape of the tank were not given. He assumed, however, that it was rectangular; and this being so, there was always a liability of a leakage of water at the joints at the angles, even though they had been filled and rounded off—a risk that was entirely obviated in the circular or elliptical form. It would be instructive to know the percentage of the reinforcement used in the beams comprising the tank. The usual proportion of steel to concrete in a Hennebique beam worked out at about 3 per cent.; being equally divided between the cranked and straight rods. In this case compression members were introduced; and the percentage would therefore probably be higher—perhaps as much as 5 per cent., owing to the reduction of the sectional area of the concrete. A great deal of evidence had been adduced to show that metal embedded in a good ordinary concrete underwent no change; but experiments made by M. Breuillé indicated that in certain cases heavy water pressures acting on intensely stressed concrete steel, changed the concrete, and then the ferric layer surrounding the reinforcing steel, destroying the adhesion under alternating pressures. This would at first sight seem to prove that concrete steel was unsuited for hydrostatical employment; but there was no similarity between the hydrodynamical conditions under which these experiments were made and those of ordinary structures exposed to the vicissitudes of the atmosphere. The advantages of a finely-ground cement (other things being equal) could not be over-rated; and it was now possible to obtain cement which would give results comparing very favourably with granite. He concluded by expressing a desire to know the cost of the tank, as compared with that of a steel or brick and concrete one. Professor Henry Robinson remarked that the ferro-concrete system had been the subject of some controversy—in fact, until recently it was thought that the Local Government Board would not sanction work designed on this principle. About three years ago he was engaged in a case when this view was put forward; but the scheme was passed by the Board, and the work had been carried out successfully. Mr. R. J. Gifford Read said he had a very good opinion of the ferro-concrete principle; and he thought it was going to be very much more used in the future than it had hitherto been. As far as he had seen, if the concrete was made well, it was thoroughly water-tight.

The next speaker was Mr. E. J. Silcock, who wished to know on what sort of foundation the tank was placed, as he could not see why fortified concrete should have been used in a granite country. If the ground on which the reservoir stood had anything like a firm foundation, the beams were useless; while if it was not solid, he questioned whether they could be made strong enough to carry the water. Mr. Percy Griffith thought there was no more interesting work than the construction of a reservoir on a somewhat steep hillside. The great difficulty with regard to all these new systems was to obtain records of personal experience; and therefore Mr. Latham's paper was of great value. Referring to the use of the additional straight round rod in the Penzance beams, he pointed out that a circular rod was not economical for compressive strains; and he was also not quite clear whether rust caused an increase in the diameter of the rods. Mr. A. S. E. Ackermann said it was highly necessary that they should know the cost of the tank. Quite recently he had to go into the question of designing a new reservoir; and he was very strongly in favour of armoured concrete. It had been stated by Mr. Morris that the cost of a reservoir holding 2¾ million gallons, built wholly of concrete, and covered with concrete arches, was £2 18s. per 1000 gallons of impounded water, as against from £5 to £7 the usual cost of brick-covered reservoirs. He (the speaker) got an armoured concrete firm to give him an estimate for a 1 million gallon circular reservoir; but he was disappointed with the price, which came out to £5 per 1000 gallons, though this was still cheap compared with high-class brickwork. Mr. H. Glynn Warne also wanted figures as to the comparative cost of the ferro-concrete and other systems—especially masonry, which in the West was very cheap. He asked how it was the Local Government Board were induced in this case to adopt a reasonable attitude with regard to reservoir construction. He knew of one instance where a system of armoured concrete was proposed; and the Board, while not absolutely refusing to allow it, pointed out that they would have to grant the loan for a reduced number of years, within which period they were satisfied that any system of armoured concrete would break up and be practically useless. Had the Board in the case of Penzance agreed to spread the loan over the usual period, because if they reduced the time to any considerable extent it might be worth while to adopt some system which on the face of it was more costly?

Mr. Latham, in the course of his reply to the discussion, said the Local Government Board were very critical, and required a great deal of information. They, however, obtained the loan for the full period for the whole of the water scheme. Unfortunately, time would not permit the author to deal with all the points raised; and the important question of cost was among those that remained unanswered.

A vote of thanks was accorded to Mr. Latham for his paper.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Prepayment Meter Clauses.

Sir,—It being suggested that every Gas Bill should contain clauses dealing with the terms on which the supply shall be given, so that the rate for gas should include the use of meter, stove, and fittings, there appears to be some danger of misapprenhension in influential quarters leading possibly to miscarriage.

The first legislation on the subject was promoted by the London County Council for London, and was fully acquiesced in by the South Metropolitan and the Commercial Gas Companies, because the extra rates they were then charging—10d. per 1000 cubic feet—coincided with the proposal of the Bill.

The rate for the Commercial Gas Company was settled by myself some years before, and was based on the anticipated consumption of 12,000 cubic feet of gas per annum by a consumer who would require to have a service laid and a coin-freed meter with fittings for three lights and a small boiling-stove attached.

It was found that this work would involve the capital outlay of, say, £4 10s.; and so, if 12,000 cubic feet of gas per annum were burnt, twelve times 10d. would give 10s. a year, which would allow of a 10 per cent. return for interest on capital, depreciation, renewal, and wear and tear, *plus* 1s. for extra cost of inspection and collection.

It was ultimately found that these consumers desired a cooking-stove, which added some 50s. to the expenditure. At first a small additional rental was imposed; but as the stove consumed about half as much gas again as the original fittings and boiling-ring, it was seen that the extra 6000 cubic feet at 10d. per 1000 gave 5s. per annum. This again was 10 per cent. on the £2 10s., for interest on capital—say 4 per cent. for renewals, and 6 per cent. for repairs.

Therefore no opposition was offered by the Commercial Gas Company to the enactment (at the instance of the London County Council) that 10d. per 1000 cubic feet should be charged.

It is clear that a fundamental consideration is that, beyond a fixed minimum consumption, any extra outlay made will be repaid by the extra consumption at the extra rate charged for the gas; and experience, based on a number of different important towns, shows that the consumption will range between 12,000 and 20,000 cubic feet of gas per annum—with, however, many experiences of a lower consumption, which are necessarily unprofitable.

It may be said here that the collection of an ordinary gas bill can be accomplished at 1 per cent. But the collection of the coins from the meters is necessarily laborious; and though carried out by a collector of a cheaper class, is not accomplished under a cost of 5 per cent. Similarly, any visits of inspection, attending complaints, &c., will, by reason of the smaller consumption, cost some two-and-a-half to three times what they would cost with the ordinary consumer, who is estimated to burn about 35,000 cubic feet of gas per annum.

Clauses were recently shown to me for a company taking an unopposed Bill through Parliament, suggesting that the addition to the price of gas should be less where only a meter was fixed and fittings, than with a stove, and less again where only a meter was fixed without fittings, and this without any provision that the consumption of gas was not to fall below an agreed quantity per annum. The figures suggested were 4d. per 1000 cubic feet for a meter; 8d. per 1000 for meter and fittings; and 1s. per 1000 for meter, fittings, and stove—for a company whose limits of supply included rural districts with a bare population. It is clear to me that such clauses were not based on sound reasoning, because the addition of fittings free and stoves free would almost necessarily increase the consumption of gas, and that without them there would not be guaranteed a consumption large enough at the amount per 1000 cubic feet added to return the necessary interest, renewal, and wear and tear of the installation.

But apart from these clauses, the Derby Gas Company (with whose Bill I was concerned) last year accepted 10d. per 1000 cubic feet for the entire service; and there is a disposition to enact clauses with the same amount for companies, irrespective of their being under the same circumstances of an urban population closely gathered.

Such an amount as 10d. per 1000 cubic feet would, in the case of small undertakings in rural areas, be entirely unremunerative; and as it appears that the compulsory clauses as to supply would come into operation under these conditions, it will behove those who are dealing with applications for further statutory powers to look closely into the circumstances of each case before accepting a definite figure.

Moreover, there are insuperable practical difficulties to having meters adjusted for different prices of gas. There is no necessity for it. Indeed, the additional price (if any) should be put upon the consumers employing the gas in the smaller degrees.

It is important that the arrangement should be very clear and easily understood by the consumers—that it should be elastic enough to provide for a considerable range in the annual consumption by different classes of consumers without calling for special adjustments in prices, contracts, and methods of accounting.

The existing plan of a lump sum—whether 10d. or 1s. per 1000 feet—to cover all variations, has proved most successful, and is very popular among the very poorest.

Hy. E. Jones.

March 14, 1904.

Reinstatement of Roads with Concrete.

Sir,—I should esteem it a favour if any of the readers of the "Journal" would kindly give me the benefit of their opinion as to whether a gas company holding statutory powers of the usual order can be compelled to fill in all the trenches they may require to make in the public roads and streets of the town they supply—whether for the extension of mains, service-pipes, &c.—with cement concrete, in such a way that the main shall be entirely embedded in this material. The roads generally are constructed with but a moderate covering of gravel or metal; and the compulsory carrying out of such an order would not only involve considerable expense in the first instance, but would render the work of reopening the roads at any time for service-pipe connections, the repairing of leakages, &c., much more difficult, and might be attended with considerable inconvenience.

S. X.

March 12, 1904.

The Proceedings on the South Shields Gas Bill in Committee.

Sir,—Might I ask you to correct the report, in your last issue, of the proceedings before the House of Commons Committee, of which I was Chairman, on the South Shields Gas Bill?

I am made to allude to the "Home Office Committee on Power Gas." I made no such allusion; and there is no such Committee. The phrase appears to have crept into the report from a question by one of the Counsel to a witness.

Frederick W. Fison.

House of Commons, March 10, 1904.

[The error, which had been noticed before the above letter came to hand, is corrected in another column to-day, p. 704.—Ed. J.G.L.]

Electricity v. Gas at Burton-on-Trent.—According to a statement made at the meeting of the Burton-upon-Trent Town Council last Wednesday by Mr. Tresise, when moving the adoption of the minutes of the Gas Committee, the falling off in the consumption of gas during the past two years has been retrieved, and the undertaking is now in a better position than it was in 1902. Last month there was an increase of 3¾ million cubic feet, compared with the corresponding month of 1903—a fact which must have been very gratifying to Mr. F. L. Ramsden, the Manager and Engineer.

Effect of Free Cookers in Manchester.—During the eleven months ending with February, there was an increase in the consumption of Manchester gas, compared with the previous period of 1902-3, of 2·85 per cent. The increase in January, compared with the consumption in January, 1903, was 1·98 per cent.; and the increase in February, compared with the corresponding month last year, was 8·75 per cent.; so that the increase for these two months was 4·97, or practically 5, per cent. The additional consumption has taken place in the daytime, between the hours of 8 a.m. and 4 p.m., and bears evidence to the fact that gas-cookers are being brought very much into requisition. Since the Council, last June, decided to abolish gas-stove hire, no fewer than 5000 cookers have been sent out by the Corporation.

THE NEW ENGINEERING WORKS

OF

MESSRS. GRAHAM, MORTON AND CO., LTD., LEEDS.

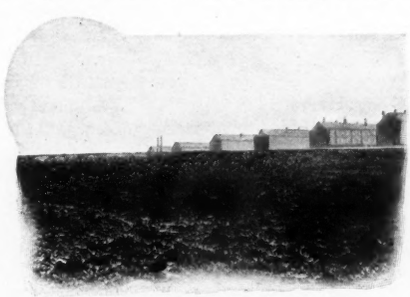
By "JAMES CASSIDY."

THERE is nothing new under the sun—not even excepting radium; but then there is nothing old, for reformation and re-construction are the order of the day wherever that may be in the Calendar.

But, although it is true in a limited sense, that "there is nothing new"—that "out of last there comes the first"—yet we all feel at least chagrined (to express it mildly), when taking up a well-known paper we find that a bold headline, introducing a leading article on some "Modern" works and their appliances, means nothing more than a "*Modern*" *of fifty year old!* Readers of the "JOURNAL" shall be spared such annoyance, so far as we are concerned, as the works and offices we herewith describe are more modern than—well, than even Japanese tactics!

Mr. Maurice Graham.

Until May 16, 1903, the site on which Messrs. Graham, Morton, and Co.'s works now stand was a marsh, or at any rate an unoccupied field. By Nov. 21 of the same year, they started in full swing—six months saw accomplished a feat ordinarily occupying three years. After that we may well admonish "Wake up America;" Old England has roused herself and shaken off the Philistines. Enlarging on this subject later on in this article, we shall give a brief account of some remarkable constructions and erections carried out by the Company. At present we shall, after examining a consecutive series of photographs showing weekly stages in the construction of the works, make rapid tour through the various departments, with the kind permission of the Managing Director.



Unoccupied Field May 16th, 1903.

Leaving the separate block containing the Company's offices, we accompany our guide to the buildings constituting the works. The main floor extends to a length of 420 feet, and is 150 feet wide. Substantial, but not heavy, it presents special features of interest. The ponderous gloom so oppressive and apparent in many of our great factories has no portion here. For lightness and brightness, we might be in the Crystal Palace. as Sir Joseph Paxton realized it. Both roof and sides (walls) are of glass, supported by steel girders.

We ascend a flight of stairs in order to obtain a full view of this floor and its busy workers. Standing in position on the landing at the head of the stairs, we look down on a suggestive scene. Stretching away into vista are sections of designs in iron-work in all stages of completion; for in this department we are at the headquarters of the constructional iron-work. Over there, to the left, we see bridges in the making, to the order of the Great Western Railway Company and 57 girder bridges for the Bengal North Western Railway Company. Another bridge, hard by, is intended, when completed, for the Halifax Corporation. Here, too, work is progressing to the order of the Admiralty and War Office. In the centre a group is occupied on sections of roofing for tramway stations; and a little further on another group is engaged on elevating and conveying work, for Australia (Melbourne and Sydney). Away to the right, we notice in course of construction several large measuring chambers for electric light stations. The picture is a fascinating one, and no photograph, be it good enough to satisfy even the most skilled photographer, could do it justice.

June 15th, 1903.

Again we must remember too, that "the eye only sees that which it takes with it the power of seeing," and Turner's

pertinent "Don't you wish you could, Madam?" directed to the old lady who objected to his sunsets, on the score that she had never seen such, is equally applicable to the way in which we see, or fail to see, the significance of our great engineering works. But to quit moralizing. Here we are in the chain-shop, with its six four-spindled drilling machines, and numerous lathes—all electrified into alertness, for how could they be other than active when there is so much to be

July 6th, 1903.

done? Thirty to forty different kinds of chain are required for elevators and conveyors alone—some cast steel, some stamped steel, but all drilled in jigs to ensure true centres.

On the same floor, in another section, we observe several hillocks of "idlers" for belt conveyors, angular and flat—the former for carrying the loaded belt, and the latter the unloaded. All sizes of belting, from the humble 12-inch, to the more pretentious 42-inch, can be accommodated with suitable idlers. "Here is a heap of idlers-in-the-making," says our guide. Steel tubes cut into specified lengths, cast-iron centres, turned and pressed by hydraulic pressure, and subsequently mounted on to hollow steel spindles, the whole secured between angular cast-iron brackets, and kept in good temper—rendered, in fact, practically frictionless—by the indispensable lubricator, supplied with an adequate quantity of the indispensable grease.

Turning our back on the idlers, we walk to the end of the platform in the chain shop, and look down on to the fitting and machine shop, immediately below. Were time of little moment, we could spend a good deal here, watching the various processes and operations in progress below. A capital space this—200 feet long by 40 feet wide—in which to be busy. Here are "tools" and the "men who can use them." Surely suggestions of potentialities are hereby

July 27th, 1903.

implied! If Carlyle's claim be allowed, that "he is King who *can*," are there not workshop "Kings" who attest the dignity of labour? How are they employed? Some are at work on gearing, for elevators and conveyors; there are gear-wheels on shafts for gravity-bucket-conveyors, bale-elevators, coal and coke elevators, ash-elevators, band-conveyors, and revolving-feeders, and a complete large screening plant for New Monckton Colliery.

In the middle of the shop we see a wire-mesh conveyor in course of construction for a well-known fire-lighter company. Away, beyond, others are engaged on steel grids for hot-coke-conveyors; for some of the best known conveying machinery is turned out by this enterprising firm.

In the centre bay is the blacksmiths' shop, well worth notice, if only on account of a special sanitary feature, the *exhaustion of sulphur fumes* by an 18-inch wrought-iron pipe, which is carried under the floor and outside the building. On girders up and down the entire length of the workshops, five electric cranes of ten tons are continually travelling, carrying work in all stages of completion. The men travelling with the cranes find great advantage from the exhaust pipe in connection with the blacksmiths' fires below, as the air is thereby kept free from sulphur fumes and thoroughly wholesome.

Leaving the centre bay behind us, and looking down from our landing, we fix attention on a north-west corner, and watch the men at work, lining out templates for roofing and tank work. Here spread before us is a picture. From our point of vantage, we see bright blue-prints from the drawing office; large steel sheets, suggestive of magnified black boards with compasses and chalks, near by, while manipulating all, labours the brave little sprite, "Knowing-How."

"Everything, as far as practicable, is 'standardized,'" observes our informant; but, had he not made the observation, we should have known that in these works so smart and modern, fitted as they are throughout with the latest labour-saving devices, standardization was the order of the

August 18th, 1903.

day. Before such order obtained, under the old and almost effete system, fresh templates would have been required for each job. Now, it goes without saying, standard patterns, whether in templates or parts of machinery, are stored for future use. It has been computed that a saving, in some cases of as much as 33 per cent., is thus possible.

Leaving our point of vantage, we descend the stairs to the tool shop, immediately below the chain department. In this workshop are wrought the whole of the tools required throughout the entire works. Here we notice that ingenious American invention, the Gisholt Tool Grinder, in which it is possible to use seventy different kinds of turning and planing machine tools. Such is its adaptability, that it can grind all tools to any and every angle required; the tool-holder being movable to any position in relation to the corundum wheel. A great advantage accruing from the use of this machine is that of time-saving, inasmuch as it is only necessary for the smith to forge the tool roughly, the machine doing the rest. It is tempered by cold blast, and subsequently finally ground.

Adjoining the tool-room are the general stores, where are kept, by a well-approved system, all supplies for the engineering shops. We do not stay to examine these in detail, as there are several interesting machines in the erecting shop, with which we wish to make acquaintance.

We peep at them in order of location: (1) Our first inspection is of a 52-inch boring-mill, fitted with a revolving table, and a vertical bore. It works in any position, and is distinguished by its special aptitude for boring and facing

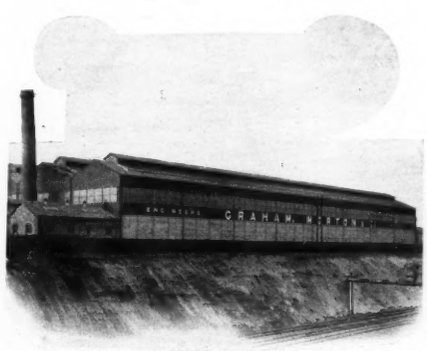
wheels at one operation. (2) The second is a key-way cutter, for cutting keyways where required—say, in couplings, gear-wheels, &c. It cuts any width, from ¼ inch to 2 inches. It is, like No. 1, of American invention. (3) The third

September 23rd, 1903.

machine we inspect is of British invention and make, and serves the purpose of milling—superseding the older planing and shaping machines. (4) And now we have reached a 250-ton hydraulic press, for pressing the seamless steel corves (colliery tubs), &c., for the manufacture of which Messrs. Graham, Morton, and Co. hold the first place. (5) A second and smaller hydraulic press is employed for pressing the ends of riveted corves and body-plates for elevators, &c.

Passing out from the fitting shop, we wend our way to the power-house, where resides, so to phrase it, the "soul-of-the-story." Two sets of Belliss and Morcom's high-speed engines coupled direct to 150 kilowatt generators (equal to 200-horse power), each running at 450 revolutions per minute, and generating 220 volts. These supply the whole of the power for lighting and for works' motion. A small auxiliary engine, driving a 35 kilowatt generator (equal to 48-horse power) for lighting the offices when the works are closed, occupies its own special position in the power-house. Here too is a double-acting hydraulic pump, with cylinders of 14-inch diameter, and with a 20-inch stroke. The electric switch-board is one of Crompton's fine make, able to hold its own against all competitors.

It would be unfair to conclude our tour of the works without looking in at the boiler-house, where dwells that hard-working and reliable servant of the Company, a Lancashire boiler. Its length is 30 feet, and its diameter

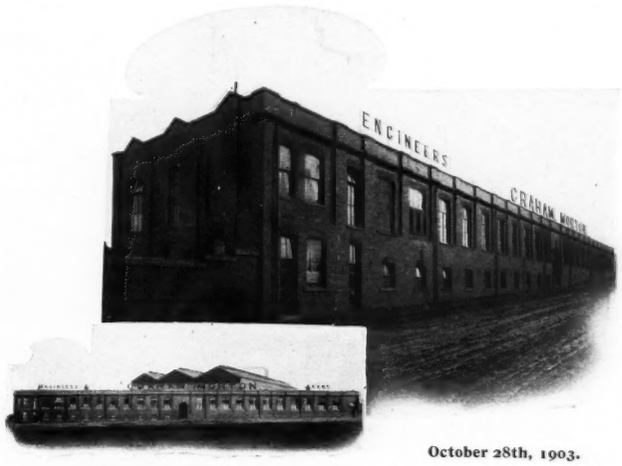


October 14th, 1903.

8 ft. 6 in., and it is working at a pressure of 160 lbs., generating steam for the works' engines, &c. Fixed to the back of the boiler, we notice that safety-factor, a steam-superheater, which prevents water being carried forward with the steam. There is also in position the usual feed-water heater, heated by means of the exhaust-steam.

As we pass out of the main works to look in at the pattern and joinery shops and the men's messrooms, prior to visiting the offices, we notice that substantially built land-mark of the neighbourhood, the factory shaft. It is 90 feet high, and of cheery red brick. A few steps and we are in the "time" office, where each man registers his time on a "Dey" time-keeper, so that should he not be satisfied with the hours he makes, he has only himself to thank. Here are fixed the electric-bell indicators for messenger boys. By the employment of these lads, a great saving in the time benefits the workman, who, should he require fresh tools from the stores, &c., is not obliged to leave his work to secure them.

But here we are at the pattern shop and stores. These occupy a separate structure. As an instance of lightning speed in construction, it should be stated that this shop was erected and occupied by workers within the space of a fortnight. Its length is 60 feet by 24 feet, and its height attains 21 feet. As we stand in the doorway and look about us, we observe that it is fitted with two turning lathes, two trimmers (paring machines), band-saws, and wood-planing machinery, for thicknessing and moulding. This department is one of the most individual in the great works. Here it follows there is no standardizing. All the patterns are made from the best yellow pine; and how numerous are



October 28th, 1903.

November 2nd, 1903.

those patterns may be easily grasped when it is appreciated that all the joinery necessary in the erection and installation of contract-plant is produced by the skilled staff operating here. At one end of the pattern shop is a section provided with racks for storing patterns—an extension being intended to meet accumulations. At the other end is the department known as the erectors' stores, and containing, to use the words of its president, "all tackle for erecting any kind of work." The place is adequately provided with fire-appliances, and all machinery is driven by electricity, which also lights the place refulgently. During the daylight hours, the light is obtained from the sides and sky-lights. Two Railways run through the works, so that transport facilities are everything that could possibly be desired.

We now turn our attention to the offices. The length of the building comprising them is 270 feet, and the width 41 feet, or a little less than one-sixth of the length. The height from the top of the parapet wall is from 18 feet to 28 feet; the site being a slope. Advantage is taken of the slope at the lower end to provide a basement divided into several rooms, used for subsidiary offices, mess-rooms, reading-rooms, and stores. The hot-water heating apparatus for warming the whole building is situated here.

Ample light is admitted by windows just above the level of the pavement. The rooms are commodious and well-fitted. All the offices are on one level, with the exception of the subsidiary offices in the basement.

The main entrance hall is at the centre, dividing the

building into two parts. That on the right contains the drawing office (117 feet) with its various departments—estimating and inquiry; general; colliery; drawing store and blue-print room. At the extreme end of the drawing

Chain Shop.

office is the weigh-office; immediately outside this being the weighbridge, and the works entrance. To the left of the main entrance are seen the inquiry office and waiting-room for callers. Leaving the waiting-room, and passing through the glass doors marked "Private," we are admitted into a corridor, lighted from above, and fitted at intervals with ventilating fans. To the right and left of the corridor are the different offices. Those on the right comprise telephone-room, block-storing room, typists' and filing room (the two latter separated from the corridor by a glazed screen), the Managing Director's office, the board-room, the publicity department office, and representative's office. Those on the left, following on from the waiting-room, include the General Manager's office, the Secretary's and the general clerical office (the last two being separated by a glazed partition which permits eye-control), and the strong room.

Beyond the offices, constituting the extreme left corner of the building, is the porter's lodge. Here another entrance is provided leading to an out-building, comprising stables and coach-house. In addition to the main approach, there are several entrances from the works situated to the rear of the offices.

Tool-Grinding Department.

The roof is in three spans. An economic point is thus scored, as, owing to the small spans, light scantlings only are required. Two rows of cast-iron columns act as supports, and run the entire length of the building. The centre-span is glazed, to ensure the admission of sufficient light in the middle of the building. The outside spans are covered with blue slates, and match-boarded beneath.

The whole of the front of the exterior of the building is faced with Accrington plastic bricks, of which 106,000 were used.

The windows are arranged to obtain the maximum amount of light, being both numerous and large. The lower panes are of ground-glass, and therefore opaque to inquisitiveness, while admitting light; the upper panes and hinged flaps for ventilating purposes are of transparent plate glass. The light-area of each window is 40 square feet. The total area of windows for the entire building being 6950 square feet.

At this point—instead of entering the offices by the spacious entrance hall—we approach them by the yard, and enter from the basement. We have during our visits to innumerable large and important works traversed many basements, but have yet to see any that can claim equality with that we are now describing, either in appearance, or comfort, or for the sound common-sense apparent in every detail of construction and finish.

A corridor admits to a number of private offices. The first we enter is that of the inspector-of-work. The duties of the gentleman occupying this position are of wide scope, covering as they do an inspection of all work turned out by the works. A second office is at the service of the manager

Fitting Shop.

Plating Shop.

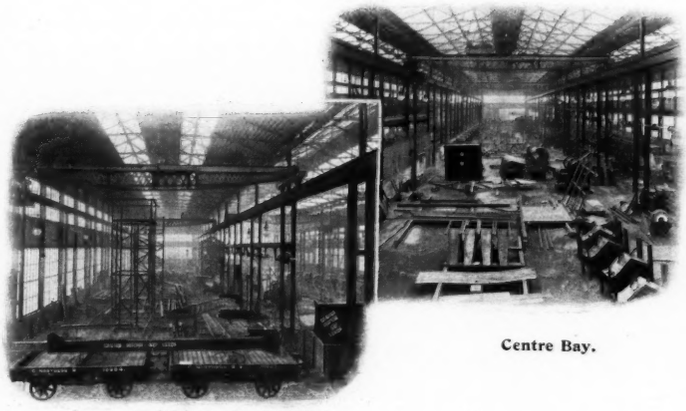
of outside erectors. His particular duties call him to follow the work and watch its erection, &c. We try the door of a third office, but find it locked; for here are kept the systematically arranged drawing office stores. Hard by is the

Consulting Room.

drawing office mess-room, provided with little tables and chairs, a comfortable place, and a buzz of animation at lunch-time. There are several spare offices, large and small, for the extension of staff, which is certain, as progress continues. One large room is used as a reading-room.

Here is a second mess-room, used by the clerks; and a snug little place it is, with its white marble tables for two, its warm thick linoleum, and easy chairs.

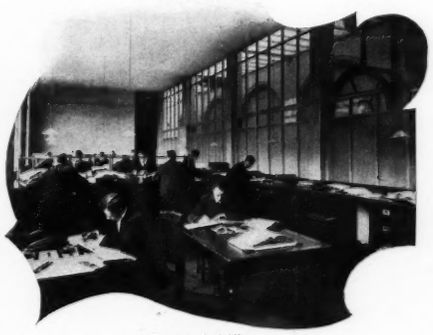
Leaving the basement, we ascend a flight of carpeted stairs, and commence a series of introspective peeps at the various offices on the ground floor. To say that their arrangement is admirable when that word is so often misapplied, signifies but little. Light, lofty, elegant, are terms applicable here. We tap at the doors of individual offices and look in. No. 1 is, for the time being, empty. It is allotted to the service of the firm's representative, who is constantly travelling about the country on the Company's business. It is a typical office, admitting freely the cheering and inspiring light. Its walls are hung with a restful green shade, and doors and wainscot are finished in two shades of green, in unison with the latest mood of science, which prescribes these colours for brain-sanitation. The chairs are of dark polished oak, upholstered with dark green leather, and in one corner of the room flourishes, in luxuriance, a fine pot bay-tree. The carpet suggests the Orient, being of heavy pile and mingling soft rich colours. What manner of work is possible in such a delightful office! But then all the other offices resemble it, some may be a trifle larger, some a trifle smaller, but the variation is almost imperceptible. All are alike designed, constructed, fitted, finished, and furnished in a similar style. What would dear old John Ruskin have said to this realization of an ideal, had he been alive to tour the place?



Centre Bay.

Structural Shop.

The board-room is a magnificent room, 28 feet long, with effective embossed ceiling and coping, and the walls decorated with green sanitary damp-proof paper. In the centre stands a fine oak table, and at the side of the room, facing the windows, a massive polished-oak carved sideboard. Richly upholstered easy chairs, and soft richly-tinted carpet, go to make an exceedingly attractive board-room. The radiators send forth over all a warm and welcome glow.



General Offices.

Another fine room (almost as long again as the board-room—*i.e.*, 50 feet) is that distinguished as the general office, with the strong room beyond.

To the left are the offices of the General Manager and the Secretary of the Company. The office of the latter occupies a point of vantage that gives him direct eye-control of the staff working in the general office. Here the card-system, adapted from that obtaining in public libraries, and adopted throughout the establishment, is in use. The light and space and general brightness of this room ensure conditions under which the best work is not only possible, but required.

Manager's Office.

Our next peep is into the rooms of the Managing Director, the motive power of the mind of the work executed in the works. It is his ability to see, where to others is mental darkness; to grasp the aërial colours and bubbles from the land of ideas, and reduce them to tangible results of great value, that has made the name of Graham, Morton, and Co. famous in the engineering world. Mr. Maurice Graham is indomitable. Difficulties are his playthings; they exist to save life and business from becoming tame and monotonous. "Speed destroys pressure" might very well be his watchword. He speaks, and his words crystallize into actions. Bridges, conveyors, power-stations, elevators, crushers, screeners, &c.; and why? For the simple reason that before he speaks he has planned out and completely organized the entire procedure, whether it be an installation in Milan, Paris, or South Africa, running into hundreds of thousands of pounds, or the erection of Company works in an incredibly short space of time. For, be it known, Mr. Graham is quite willing to undertake to tender for the erection of new up-to-date engineering works for any firm on the face of the globe who may wish for such tender, and to

Reception Room.

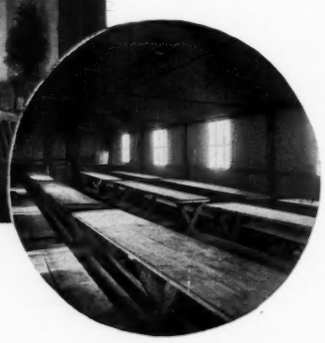
carry out the contract, as he was ready to design and erect the works and offices it has been our pleasure to describe.

But to return from a digression invited by the sight of his office, where the busy Managing Director is so often at

Entrance.

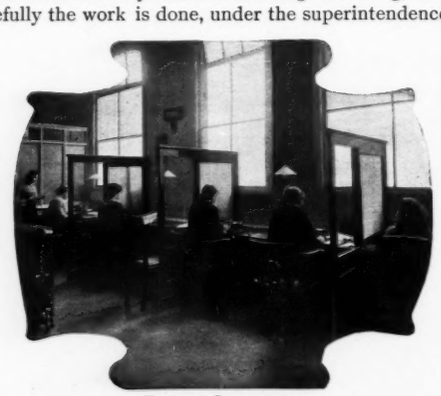
work. Not far away is the typists' room. Here, morning, noon, and night, nimble fingers, directed by alert young eyes, tap out on the numerous machines, the commercial story of the Company. North, south, east, and west, fly

Mess Room.



Workmen's Meal Room.

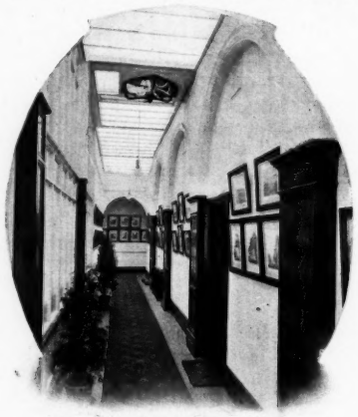
their letters, red-hot, so to phrase it, from the typewriters. Letters are not only despatched from the room, they are received here for systematic indexing and filing, and very carefully the work is done, under the superintendence and



Typists' Department.

direction of the head typist, whose intelligence and distributive ability mean so much to the efficient conduct of other departments.

And now we are in the handsome corridor, and look up at the ventilating fans, driven by electricity, and down at the ornate green carpet. We observe the ornamental archways on the walls, resting on enamelled columns, and stand to examine the gallery of pictures ranged on either



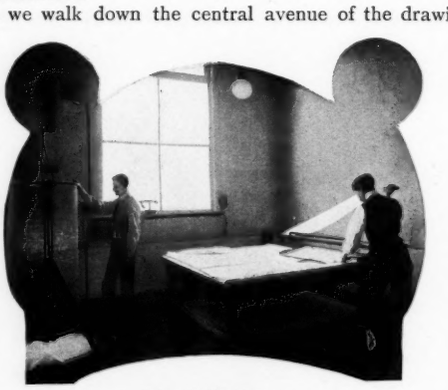
Private Corridor.

side, representing the firm's work in all parts of the world.

From the corridor to the drawing office, and we are at the headquarters of the large staff of designers and draughtsmen, whose work has won a world-wide reputation, and enabled the Company to secure contract after contract against international competitors to right and to left of them.

The first division of the drawing office is the estimating department. Here all inquiries coming to the offices are conveyed, to be promptly dealt with ; complete drawings and specifications being prepared, where the answer suggests such. Drawings, calculations as a basis for specifications, and the finished specifications, are subsequently sent into the tracing department, and the latter completed are received into the blue-print room, where in the "Duplex Radial Photo Copying Frame," with the assistance of a special arc lamp, supplied with big voltage, and fitted with switches and resistances, and a special window to allow of the required light, the prints are made, being afterwards carefully washed, and squeezed, and dried in the hot-air chamber. It may well be imagined that many thousands of drawings (tracings, the original drawings are destroyed) and prints are indexed and filed away in the capacious set of drawers allotted to their reception. Before storing, the finished blue prints are returned to the estimating department, and there checked and numbered.

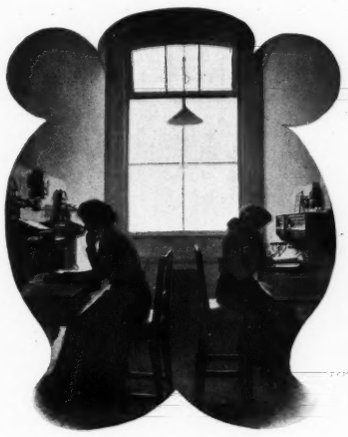
As we walk down the central avenue of the drawing-



Blue-Print Room.

office, passing the busy artists, we observe that the place is flooded with light, the light being admitted both through top and side glasses. All partitions, demarcating various sections, are of glass, and all woodwork is painted white. The windows are in position to accord the coveted north

light. Each desk is provided with movable electric lamps, with light adjustable to any angle; and the entire office is heated by means of steam pipes and radiators. The drawing-office may be considered as sub-divided into estimating,



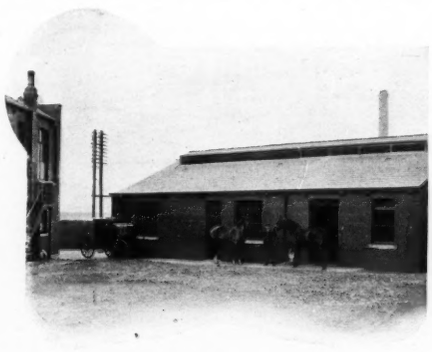
Telephone Exchange.

general, and colliery departments. In the general, all detail work is drawn out, connected with gas-works plant, coal handling plant, for electric power houses, including conveying and elevating plant, bridge-work, roof-work, structural work, &c. It is here that, after an order is obtained, all material is ordered for the shops. The drawing-office staff numbers fifty.

A very important division is that which looks after the firm's advertising, known as the "Publicity Department." Its scope covers both the written and printed word; and its records constitute the archives of the Company's work. Here are hundreds of blocks, arranged to the easy and admirable card system, by which at a moment's notice the required block is forthcoming. In the offices under the management of this department are press-albums, containing the press-notices of erections by great engineering works, in whatever part of the world they are situated. Special albums receive the notices that appear from time to time of the firm's own engineering feats; and the day cannot be far distant when the accumulation of such matter will constitute a library in itself.

The Press-correspondence conducted by the department is heavy; and as inquiries and requests for information from leading journals increase daily, additions to the staff are certain.

No. 7 is a very popular office. It is the telephone room; and here we see operators at work, on one side attending to calls from the general exchange, on the other to calls on



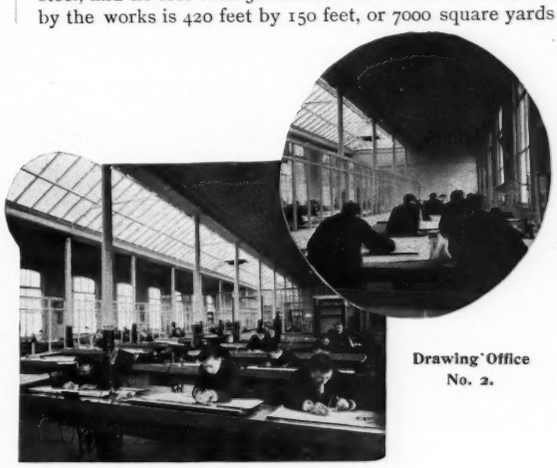
Stables.

the firm's own private exchange. Every office has its own telephone. The economy in time and temper effected by the free employment of these ingenious little instruments is almost incredible, as by their use the necessity for leaving the office to gather information from other offices is obviated.

A few statistics bearing on the quantity of material employed in the construction of the works and offices may prove interesting. The quantity of glass used in the works, engine and boiler houses, given in square feet, was 54,600; and in

Drawing Stores.

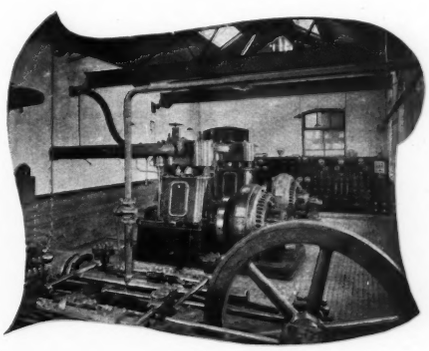
the offices, 6950. The number of panes totalled up to 5670 in the works, and 1140 in the offices. The weight of the iron-work was 343 tons of steel joists, 323 tons of sectional steel, and no less than 50 tons of bolts. The area covered by the works is 420 feet by 150 feet, or 7000 square yards;



Drawing Office No. 2.

Drawing Office No. 1.

by the engine and boiler houses, 50 feet by 55 feet, or 306 square yards; by the offices, 270 feet by 41 feet, or 1230 square yards—in all an entire ground space of 76,824 square feet. In concluding our tour through these up-to-date engi-



Power House.

neering works, we make no apology for suggesting them as an instance of what can be done in five months and a half when so enterprising a man as Mr. Graham leads the way.

A BIOGRAPHICAL NOTE AND A WORD OF WARNING.

"Maurice Graham," as he prefers to be known, is certainly a remarkable man. Born at Saughall, a parish in the counties of both Flint and Cheshire, and so in England and Wales, of an Irish father and a Scotch mother, he is essentially British. When a mere child, he evinced a talent for engineering; and we have heard it told that a little cupboard in which he kept his small models and other constructions was filled with engineering relics. We know that on one occasion, when a boy, he constructed a model for a new building complete with steeple, to architectural drawings, and made thereby his first earnings.

Eventually he decided to commence as an erector, on his own responsibility; and, having once made up his mind, he started forthwith, erecting contracts throughout Great Britain and Ireland—the work being principally steel structural work, such as roofs, bridges, buildings, &c., and also general machinery. After experience in this direction, we find him at twenty-three years of age acting in the capacity of Chief Engineer to the Automatic Coal-Gas Retort Company, Limited, of London, and actually securing the contracts as well as engineering them. At that time, no firm had gone systematically and thoroughly into the intricate designs and problems connected with conveying machinery, as this class of plant was then in its infancy—millions of tons of material and merchandise being then carried by hand-labour, such as is now carried by mechanical means. Maurice Graham made it his special study, reading and experimenting on a large scale, particularly concentrating attention on what was then a new and much opposed innovation in the gas world—viz., the installation of inclined retorts.

He stuck to his colours, fought his battles, overcame the prejudices of the older engineers, and in a comparatively short time entered into partnership with Mr. Joseph Morton, a man of his own age, founding the private firm of Graham, Morton, and Co., Limited. Though a young firm, they have done some big work. In 1901, the firm undertook the largest contract in the world for the installation of inclined retorts at Edinburgh—completing it within the short period of nine months; its value being £120,000.

A second big contract, completed within the record time of seven months, was at the Milan Gas-Works, Italy. Its value was £108,000. This contract was followed by a third, this time at Paris, and of the value of £50,000. It is still running, and is exciting a great deal of interested attention throughout France; many visitors coming, from North, South, East, and West, to examine an installation quite unique both on account of style and size.

The latest thing undertaken by Mr. Graham was the building and equipment of the fine works and offices of the Company already described, and which may be looked upon as a British engineering firm's practical answer to the British and American Press. For a long time past, Great Britain has listened to the bombastic claims of America with a patience worthy of Job. She has listened to the oft-repeated taunt, that "Britons are born tired," to the contemptuous assertion that we are "asleep" in the strife of the nations' commerce, or "to the rear in the industrial conflict;" that our "insular prejudices" hold us back, "isolate" us, and "relegate us to an insignificant place." We have been told again and again that we are "unbusinesslike," "content with the obsolete," and "too conserva-

View of Works.

tive for progress." It is said that the markets of the world—South Africa for instance—are already America's; for Britain "crawls" while she "flies." "Smart," "keen," "shrewd," "go-ahead," "both-eyes-open," "alert," "brisk," "on-the-go," "you-press-the-button-and-we-do-the-rest" style, are the terms that have little or no meaning to a Briton, whose business talent is on a par with his religion—both having imitated Rip-van-Winkle. The repetition of the accusations has become so frequent that an ossification of the engineering intellect in appreciating such cries appeared to have set in; no notice whatever being paid to the accusers. Meantime, as the manner of the world invariably is, it takes a man at his own valuation, and the American engineer at his. Presently comes along Time, the tester, tries the American work by his infallible test, and pricks the bubble reputation—setting before the Board of Trade, by means of the Government Inspectors, such facts as the following.

"Superiority of British workmanship; superiority of British material employed; much lower cost of maintenance on British machinery; greater efficiency on fair testing; and far more extended life, owing both to design and material." This being so, it is not a matter for surprise to find Mr. Henry Birchenough, when reporting on the prospects of the steel structural industry in South Africa, in his famous "Blue-Book," stating that although "there is already considerable competition on the part of both Americans and Germans," yet that "the feeling is decidedly in favour of British work." He adds: "As this branch of trade is really only in its infancy on the Rand, and is capable of great expansion, I recommend it very strongly to the attention of British firms." Referring again, later on in his report, to the subject of steel construction work, he says: "It is the general opinion in South Africa that the steel skeleton frame-building has a great future before it. . . . In perfection of equipment and economy of production is the secret of success in the future." So asserts the Commissioner, whose suggestion has been anticipated by this young and vigorous firm, and not only so, but they have actually made the rebuilding of their engineering works a model object-lesson in speedy erection, and in the very class of building—steel skeleton frame—for which the Commissioner foretells so bright a future. It is not, therefore, merely by equipment and organization that they are ready to meet all the demands of expanding trade that may be made upon them; they furnish, in the design and construction of their new works, a model for inspection, and one moreover that they have been able to test in every detail, not alone in speed of erection, but in the carrying out of large and small contracts accepted by them.

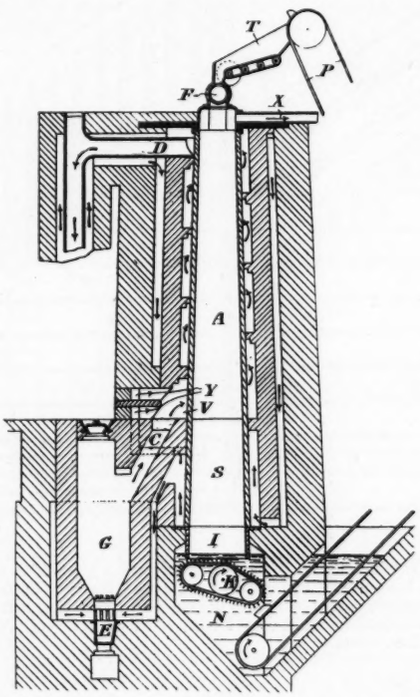
And just this closing word to such of our Transatlantic friends who make it so hard for us to love them with "all their nasty little ways," and our Transatlantic rivals, who may be the calumniators of British trade and commerce, we answer that when you hurl your accusations indiscriminately, and they come against men of such calibre as Maurice Graham, your labours—to use a Napoleonic phrase—may be likened to the futile and useless task of "biting on granite."

REGISTER OF PATENTS.

A Vertical Retort.—Westphal, C., of Berlin. No. 3331; Feb. 13, 1903.

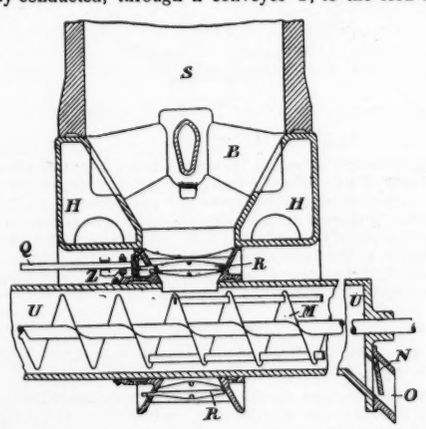
This invention relates to a retort-furnace having a vertical retort open above and below; the furnace being "designed in the first place for coking and the destructive distillation of coal, peat, wood, bones, and the like, and, in the second place, also for burning limestone or magnesite, in order to obtain calcium hydroxide or magnesia and carbonic acid." Manifestly, however, it would be applicable to coal distillation for gas-making purposes.

The retort-furnaces heretofore used for this purpose have not been found suitable in practice, the patentee remarks, because, on the one hand, they do not enable the air to be excluded without interruption, such as is required for the continuous working, and because, on the other hand, the material to be burnt does not descend uniformly in a vertical cylindrical retort; the conglomerating and swelling or distending coal being necessarily liable to adhere to the walls in its descent in a cylindrical shaft. This drawback is obviated by making the retort, not cylindrical as heretofore, but slightly tapering or conical, so as to



gradually widen from the top to the bottom; the retorts being filled at the commencement of the working with coke or oxide of lime, after the passage of which the material to be burnt—such as coal, bones, lime, or the like—is continually introduced. The retorts have a top part constituting the retort proper, wherein the heat is transmitted to the contents, and a bottom part forming a cooling shaft, in which the material remains after the expulsion of the gases until it has given off the largest part of its heat to the material above. The heating takes place upwardly, as the material contained in the retorts descends.

In the main illustration—a vertical section of a furnace designed for coking and the destructive distillation of coal or the like—the retort is made taper or conical; its lower part S serving as a cooling shaft. The material to be treated is raised to the top by a chain of buckets P, and continually conducted, through a conveyor T, to the feed funnel or



hopper provided with a rotary slide or charging device F, through which it passes to the material already collected in the retort. At the lower end of the cooling shaft S is arranged a cast-iron pipe I, which dips into the water in the well W—thus forming a water seal for keeping the retort closed at the bottom. By an endless chain K, provided below the pipe I, the coke is continually conducted away to a chain of buckets, which raise the coke from the well to a truck for further transport.

A generator G serves for heating the retort. The gases pass upwards through the inclined channel C and through slots into the combustion chamber V, then they circulate around the retort in the direction of the arrows, and leave the heating chamber through the outlet pipe D, whereupon they may be led to a steam-boiler, or may be otherwise utilized. The gases generated in the retort are conducted away by the pipe X to a holder or elsewhere to be used for other purposes.

The air serving to effect combustion is introduced by a blower, and passes upward around the pipe D. It then descends in the space between the heating chamber and the wall surrounding the retort, after which it passes upward around the cooling shaft S and is conducted in the direction of the arrows at Y into the combustion chamber V and also into the ashpit E of the generator.

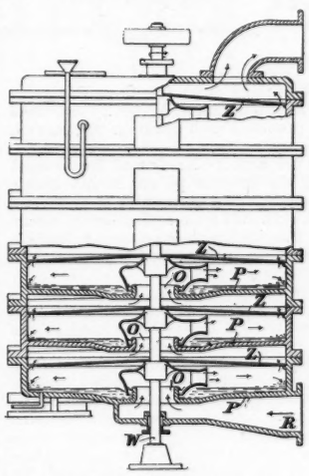
In case the retort is to be employed for burning lime (the limestone being converted in the furnace to hydrate of lime), in place of the pipe I forming a prolongation of the cooling shaft S, a funnel H, having hollow walls, is built below the retort, and a hollow cross-shaped bridge-piece B provided therein. Below the funnel is arranged a grate R, which is adapted to be turned about the pipe U by means of toothed gearing Z. The pipe U contains a screw conveyor M, which serves both for transporting and mixing purposes, and which forces the powder of hydrate of lime to the discharge pipe O provided at the end of the conveyor pipe U and furnished with a flap N.

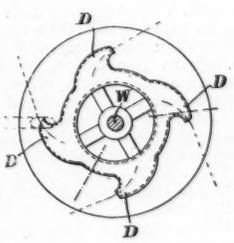
Gas-Washers.—Bousfield, J. E.; a communication from Heinrich Gerdes, of Berlin. No. 9733; April 29, 1903.

This invention relates to washers for cleansing gas from ammonia, naphthalene, cyanogen, sulphuretted hydrogen, and other impurities; the object being to obtain the substances washed out in as concentrated a state as possible.

In existing washers of this class, the patentee points out that the construction is based upon the principle either that the gas is caused to pass through the absorption or washing liquid, or that rods or sieves are continuously moistened with the washing liquid and their surface then brought into contact with the gas to be washed, or upon the employment of upright centrifugal devices which project the liquid laterally into the space filled with gas. The apparatus forming the subject of this invention "also comprises a centrifugal device; but it is differentiated from prior constructions in that the centrifugal device is arranged horizontally, draws in the liquid at the centre, and projects it horizontally on all sides in a finely divided or pulverized condition."

A sectional elevation of the apparatus is given; also a horizontal section of the centre portion.





The shell of the apparatus is built up of a series of sections or compartments each in the form of a short cylinder with a bottom plate P, on which lies the washing liquid, and which is provided with a central orifice O through which the gas is conveyed into the sections. Each compartment is provided with a centrifugal device; the devices being all secured upon a common shaft W adapted to be rotated by suitable means. The lower part of the centrifugal device dips into the liquid employed, which, by reason of the centrifugal action set up by the shaft, is raised and projected outwards and passes into the sections in a pulverized or atomized form through a suitable number of nozzles D. The washing liquid is thus brought into intimate contact with the gas, which enters through the inlet R at the bottom of the apparatus, thence flows through the central orifice O into the lowermost section. It is then compelled to pass to the periphery of the section by the plate Z, through which it flows to obtain access to the next adjacent section; and so on. The washing liquid enters the uppermost section, and there meets the gas which has been preliminarily washed in the lower sections. The liquid rises in each section until it overflows through the orifice O and drops upon the plate Z below it, whence it passes into the section next below it, so as to be again drawn up and projected through the centrifugal device therein.

Gas Generator Furnaces with Inclined Retorts.—Brookes, A. G.; a communication from the Stettiner Chamotte Fabrik, of Stettin, Germany. No. 3852; Feb. 18, 1903.

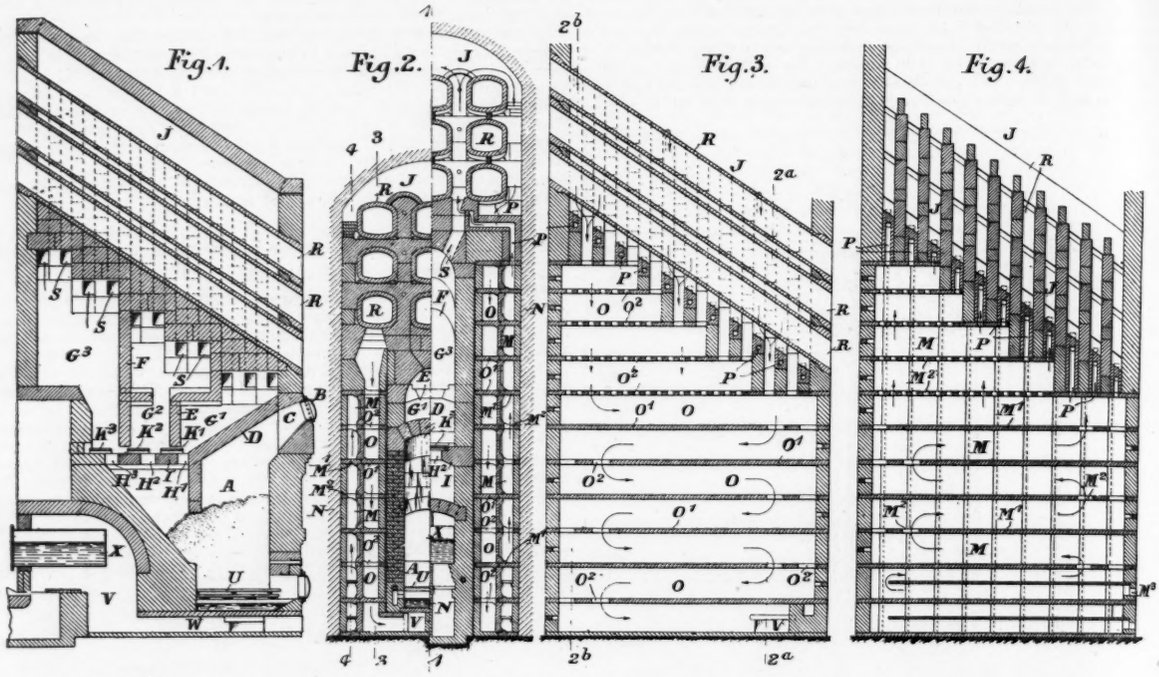
This invention has for its object to permanently maintain an absolutely uniform heat in the retorts. This is accomplished owing, mainly

to the fact that the combustion chamber of the furnace is divided into a number of separate chambers or compartments by means of downwardly directed partitions; such chambers communicating with the generator chamber through apertures controllable by dampers. This is further ensured by the special arrangement of the air-supply passages of the furnace, which serve to conduct the air necessary for the combustion of the carbonic oxide rising from the generator chamber from the air-heating passages, situated at the furnace pillars, into the combustion chamber.

Fig. 1 is a longitudinal section through the generator furnace taken on the line 1 of fig. 2. Fig. 2 is a vertical section of the furnace taken on the lines 2^a and 5^b of fig. 3. Fig. 3 is a vertical section of the furnace on the line 3 of fig. 2. Fig. 4 is a vertical section of the furnace on the line 4 of fig. 2.

In the construction of the furnace illustrated in fig. 1, the generator chamber A is fitted with a charging shoot C, kept shut, when not in use, by means of a door B. The rear wall of the charging shoot is separated from the combustion chamber by an arch D. Downwardly projecting partitions E F serve to divide the combustion chamber into three compartments G^1, G^2, G^3, which, through three apertures H^1, H^2, H^3, formed in the partition or diaphragm I, which separates the combustion chamber from the generator, communicate with the generator. The apertures are adapted by suitable dampers K^1, K^2, K^3 to be closed or opened more or less fully as required.

The combustion gases rise from the compartments G^3 through the openings S, to the chamber J containing the retorts R; the chamber being divided by vertical partitions in several compartments in the well-known manner. Before entering the chamber J, the combustion



gases become mixed with the air coming from the flues P (fig. 2). These flues are connected with the lateral channels M (fig. 4), separated from each other by partitions M^1, provided with openings M^2, leading the air entering at M^3 in a zig-zag way to the flues.

The channels M serving for the preparatory heating of the air used to support combustion, run along the furnace pillars N and beside the fire-flues O (fig. 2), which the combustion gases enter after having heated the retort. The fire-flues are divided from each other by means of horizontal partitions O^1; being provided with openings O^2, leading the combustion gases in a ziz-zag way, as is shown in fig. 3, until they leave the furnace through the smoke-flue V (fig. 1).

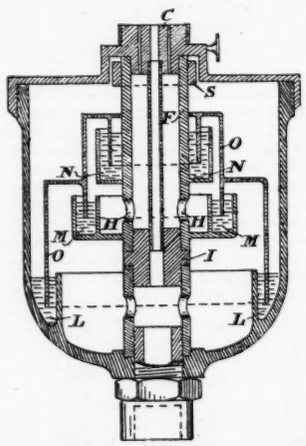
The arch D, which shuts off the charging-shoot C in the rear, is extended downwards in the form of a depending wall or partition, which, while the furnace is in operation, is invariably buried in the coke heaped up in the generator. By this arrangement, an effectual means is provided for cutting off the access of any cold air through the generator into the combustion chamber when the charging door is opened for the purpose of supplementing the charge of coke while operations are proceeding; for, "were cold air allowed to enter, this would seriously interfere with the uniform heating of the retorts, while it would at the same time injuriously affect the heated parts of the furnace." But inasmuch as, owing to the arrangement described, the entrance of any cold air into the combustion chamber is rendered impossible, while, furthermore, the amount of carbonic oxide gases passing from the generator into the combustion chamber may readily be controlled by a suitable adjustment of the regulating dampers, "every facility is afforded by the construction of this generator furnace for, at all times, maintaining the heat of the retorts at a perfectly uniform temperature."

Below the grate U of the furnace, or in the smoke-flue V, or, in both places, as the case may be, water baths W and X are arranged in well-known manner.

Automatic Gas Lighting and Extinguishing Apparatus.—Milbert, P., and Lucas, W., of Wald, Germany. No. 24,616; Nov. 12, 1903.

This invention relates to an apparatus which enables several gas-lamps to be simultaneously and automatically lighted from one point, simply by raising the pressure of the gas in the pipes, and to be extinguished by reducing the pressure.

The apparatus comprises a bell or chamber screwed at the bottom to the gas-supply pipe, and closed at the top by a cover. Between the cover and the bottom of the bell is a central pipe provided with lateral openings and divided into two parts by a partition between the openings. The partition has a small hole for receiving the pipe for a bye-pass flame. The chamber is provided with an annular reservoir L, and the central pipe with a similar reservoir or cup N above the holes, and below them with a reservoir M, each of the reservoirs being filled with some fluid that does not easily evaporate. Into the reservoirs, or into the liquid contained in them, project downwardly extending flanges of a bell O, which floats in the same way as a gasholder bell. The reservoirs L and N, with the outer flanges of the bell O, form liquid seals for the purpose of retaining the gas and preventing it from escaping. The intermediate flange forms, with its reservoir M and the bell O, a float valve.



When the pressure of gas is increased, the gas enters the openings under the bell O and raises it until the short intermediate flange is lifted out of the liquid, whereupon the gas passes into the bunsen sleeve, where it ignites at the permanently burning bye-pass flame. When the gas supply is reduced, the bell O sinks and plunges the centre flange into the reservoir, whereby the escape of gas is cut off and the lamp extinguished, except for the small bye-pass flame, which is fed direct by the ordinary day pressure.

Chargers for Gas-Retorts.—West, J., of Southport. No. 7962; April 6, 1903.

This invention relates to the retort-chargers described in patents No. 1226 of 1886 and No. 5036 of 1895, according to which the charger consists of a carriage supporting a scoop, which, after being filled with coal, is driven into the retort, and the coal deposited on the floor of the retort by reversing the scoop, which enters the retort twice to perform the operation of completely charging it. The first time it enters the retort, the coal is deposited towards one side; the second time, it is

deposited towards the other side. The mechanism which effected the direction in which the scoop is reversed was fully described in the patents referred to, and consists of a clutch engaging in one or the other of two bevel wheels on the same shaft as the clutch, the clutch being moved into gear by a hand lever under the control of the machine attendant. The proper charging of the retorts by the charger thus depended upon the scoop being reversed alternately during the operation of charging the retort, and the necessity of moving the clutch hand lever every time previous to the charger making its entry into the retort. In practice, however, it has been found (says the patentee) that the attendant is liable to neglect to move the clutch lever every time; and this causes the charge of coal to be deposited all to one side of the retort. To improve this clutch mechanism, by substituting a mechanical contrivance for moving the clutch lever and putting the clutch alternately in gear with the bevel wheels, is the object now aimed at—thus dispensing with any attention on the part of the machine attendant for this purpose.

This is achieved by adding to the charger a shaft on which there is a cam having a thread or groove in its circumference. A pin connected to the clutch lever engages in the thread or groove of the cam, and as the groove is a combinaton of a right and left hand thread, the partial revolving of the cam moves the clutch lever to one side; and when the completion of the revolution of the cam is made, the clutch lever is made to move in the opposite direction.

Fig. 1 is a side elevation of a retort-charging machine with the improved mechanical gear for moving the clutch on the charger scoop carriage. Fig. 2 is a cross section of the charger supporting frame or track in which it travels; it also shows the end view of the charger carriage and scoop. Fig. 3 is an enlarged view of the rack which engages with the star wheel on the charger carriage when travelling towards the retort.

The charger, it is seen, consists of a carriage having a scoop fitted to the end of a shaft which has a bevel gear wheel at one end gearing into two loose bevel wheels. These loose wheels are provided with clutch teeth; and when either wheel is in gear with a sliding clutch, motion is imparted to the clutch shaft, causing it and the scoop to revolve through the connection made by the bevel wheel and the shaft. The shaft has a wheel attached to it which gears into a wheel fixed on a chain drum having two grooves. This chain drum makes only a partial revolution in both directions when projections on the side of the drum rest alternately against a fixed stop on the charger carriage.

Chains for driving the charger carriage and scoop towards and from the retort lead from a chain drum driven by a rack and pinion or other suitable driving gear for the purpose, and are led round pulleys on the frame or track and fastened by a pin or bolt to the grooves of the chain-drum on the charger carriage. These chains are so wound round the drum that when one chain pulls the other is wound on to the drum. Therefore, the chains are applied not only for the purpose of driving

Fig. 1.

Fig. 2.

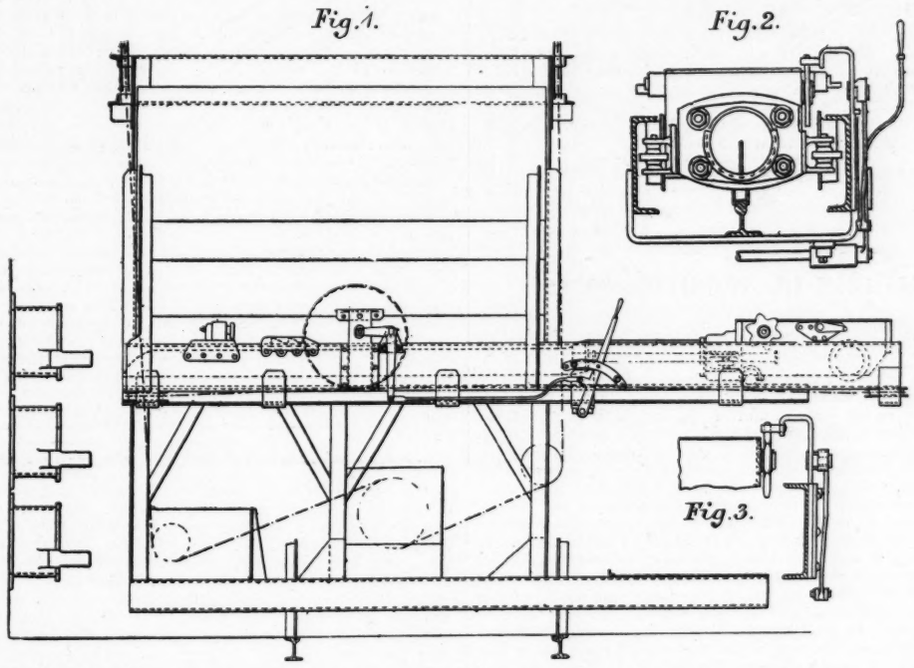


Fig. 3.

he charger in and out of the retort, but to give the partial revolutions to the drum on the charger carriage and the scoop. This operation, when the scoop is full of coal, enables it to be deposited in the retort; and when the charger is in the frame and out of the retort, the scoop is righted for receiving a fresh supply of coal.

Hitherto on existing machines, the clutch has been put into gear with either of the bevel wheels by a hand-moved clutch lever fitted with catches to hold it in gear; and this has been done by the machine attendant while the charger is at rest. In the present invention, the clutch is moved in and out of gear with the bevel wheels during the progress of the charger towards the retort, by adding to the charger carriage a shaft on which there is a cam having a groove in its circumference. A pin connected to the clutch lever engages in the groove of the cam; and as the groove is one half right and one half left hand, the half of a revolution of the cam moves the clutch lever to one side, and when the completion of the revolution of the cam is made, the clutch lever is made to move in the opposite direction.

APPLICATIONS FOR LETTERS PATENT.

4964.—Hatcher, F., "Gas-cooking stoves." Feb. 29.
4990.—Hansen-Ellehammer, J. C., "Gas-engines." Feb. 29.
5032.—Kay, M., "Atmospheric burners." March 1.
5059.—Allison, C. A., "Underground pipe-lines." A communication from The American District Steam Company. March 1.
5086.—Lake, H. H., "Incandescent burners." A communication from Deutsche Gasglühlicht-Aktiengesellschaft. March 1.
5122.—West, J., "Discharging retorts." March 1.
5123.—West, J., "Charging retorts." March 1.
5140.—Fielding, J., "Internal combustion engines." March 2.
5210.—Braunstein, J., "Inverted incandescent lamps." March 2.
5232.—Kearney, E. W. C., "Controlling gas-burners." March 3.
5291.—Dettmer, L. C., "Gas blow-pipe." March 3.
5333.—Dewey, H., "Mantles." March 4.
5341.—Hodgkinson, T. & G., "Anti-vibration gas-brackets." March 4.
5356.—The New Inverted Incandescent Gas-Lamp Company, Ltd., and Bridger, J., "Supporting the mantles in inverted incandescent gas-lamps." March 4.
5378.—Howell, F., "Gas-regulator." March 4.
5388.—Steel, M., and Thornton, R., "Carburetting gas." March 4.
5395.—Cutler, S., G. B., & S., jun., "Purifier grids." March 4.
5422.—Meldrum, J. J. & W. K., "Internal combustion engines." March 5.
5424.—Sutcliffe, H., "Bunsen burners." March 5.
5437.—Whalley, D., and The Ideal Gas Company, Ltd., "Acetylene generators." March 5.
5468.—Oldham, F. M., "Self-lighting mantle." March 5.
5478.—West, J., "Charging retorts." March 5.
5479.—Cutler, S., G. B., & S., jun., "Purifiers." March 5.
5485.—Browne, A. F., and Chandler, D., "Condensing gas." March 5.

The Cost of Water Abroad.—In Constantinople, a cubic metre (220 gallons) of water costs 7d.; at Rennes, 6·8d.; at Lyons, 6·6d.; at Versailles, 6d.; at Tarbes, 5d.; at Florence, 3·5d.; at Paris, 2·7d. (average); at Madrid, 3·2d. (average); at Barcelona, 2·5d.; at Toulouse, 2·5d.; and at Marseilles, 2d.

Electric Street Lighting at Colchester.—At the meeting of the Colchester Town Council last Wednesday, complaints were made by some of the members in regard to the cost of the electric lights in the streets. Mr. Wallace remarked that when the Council sanctioned the addition of 70 Nernst lamps the estimated expense was £210, whereas the outlay and the cost of converting the gas-lamps would be £321. He proceeded to give figures showing how much more expensive the maintenance of the electric lamps throughout the town was than gas, and said he thought the Council should take into consideration the state of trade and the position of the rates, and try to relieve the ratepayers as much as possible, instead of adding to their burdens. Mr. Thompson Smith said, considering they were spending £300 a year for the new electric lamps, he did not think they got a *quid pro quo*. The lamps in the distance looked like tallow candles; and if this was what they were paying £300 a year for, they were paying pretty dearly. Alderman Goody remarked that they might as well have a farthing dip stuck in a glass case as the lamps to which Mr. Thompson Smith had alluded. These remarks were made in support of an amendment to reduce the estimate of the Lighting Committee by £113; but they failed to effect this object.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons and read the first time: Blyth and Cowpen Gas Bill.
Bills read a second time: Manchester Corporation (General Powers) Bill, Southend Water Bill.
Bill reported: Appleby Corporation Gas Bill.
Bill withdrawn: Withnell Gas Bill.

The Select Committee appointed to consider the Barnard Castle Gas Bill and the Harlow and Sawbridgeworth Gas Bill reported on Thursday that the opposition had been withdrawn. The Minehead Urban District Council Water Bill will also go forward as an unopposed measure.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time: Brymbo Water Bill, Sheppy Gas Bill.
Bills reported: Chippenham Gas Bill, Felixstowe Gas Bill, Gomersal Gas Bill, Littlestone-on-Sea and District Water Bill, Norwich Water Bill, South Shields Gas Bill, Wellington (Somerset) Gas Bill.
Bills read the third time and passed: Blyth and Cowpen Gas Bill, Hampton-in Arden Gas Bill, Whitby Gas Bill.

On Monday last week, the petitions presented by the Carshalton and Croydon District Councils against the Croydon Gas Bill were withdrawn, and the Bill was removed from the group referred to Mr. Cremer's Committee.

GLEANINGS FROM THE COMMITTEE ROOMS.

It is the sanguine belief of those whose business it is to study the course of events at Westminster in connection with gas legislation that, in this line, there will be a complete break in the work before the Committees on opposed measures by or soon after Easter, and that then there will only be but a small end of the list to claim attention. Settlements are being graciously arranged; nearly every day in the past week having brought its addition to the transfers from the opposed to the unopposed side, while others have finished their passage through Committee. So far, there seems little disposition on the part of antagonists to measures to continue their opposition in the second House; and they are doing their level-best by appearing on clauses in the first House to get in hand as much as possible at once. There is, of course, the feeling in and about the House of an impending dissolution of Parliament; and predictions as to when the event may come run loosely anywhere between Easter and the fairly safe period of the autumn. However, the signs are that the work on Private Bills is being urged forward. If not for political reasons, it will be a pity if dissolution comes so early as to cause the shelving of the work in the Committee Rooms until after a General Election.

There was quite a burst of energy in the rooms last week; but it was not sustained. Two Lords Committees and three Commons Committees with Gas and Water Bills in their lists were sitting on Tuesday. A third Lords Committee got to work on Thursday; but the only Gas Bill in their group was withdrawn through agreement by that day. Other groups of Bills, comprising railway and tramway measures, were also under consideration; and, in addition, the Police and Sanitary Committee commenced their attack on the formidable string of measures that has been referred to them. Of the Commons Committees alluded to above, Mr. Fison's Committee finally disposed of Group B on Wednesday; on the same day Mr. Tennant's Committee on Group A and Mr. Cremer's Committee on Group D gave up work for various reasons until yesterday. The Lords Committee sitting in room No. 1 were prevented from reaching the Matlock District Gas Bill by the length of the proceedings on a Mines Drainage Bill. Similarly, Mr. W. Hardie, the Engineer and Manager of the Tynemouth Gas Company, and Mr. W. Doig Gibb were among those who were kept waiting about until Friday for the introduction of the Tynemouth Company's Bill to the notice of the Earl of Crewe and other members of the Upper House in room No. 2—the obstacle being the heavy measure of the Mersey Docks and Harbour Board. Unless agreement disposes of them, there will be two or three Gas Bills discussed this week; but their points are of an ordinary character. Croydon, Southend-on-Sea, Harlow and Sawbridgeworth, and Barnard Castle were opposed Gas Bills over which settlements were effected last week, and yesterday it was reported that differences over the Colney Hatch Gas Bill had been composed. Another feature was the insertion of purchase clauses in the Bills of three non-statutory Gas Companies—namely, Bishop's Stortford, Chippenham, and Wellington (Somerset). The South Shields Gas Bill was again before Mr. Fison's Committee on Tuesday for the final adjustment of clauses. It is now understood that there is every prospect of an agreement being come to with the Harton Coal Company; and, if this is so, it is likely the Bill will go forward without further hindrance. The Sutton Gas Company have got their Bill through the Commons Committee, with curtailments of the powers sought, but not of such importance as to cause the Company any great dissatisfaction. Regarding water measures, the Minehead District Council Bill is now unopposed; but in connection with the Barnet Gas and Water Bill, which is in Group A of the Commons, it has transpired that among local authorities there is a feeling that suburban water undertakings should be brought within the scope of the newly created London Water Board. When Mr. Cremer's Committee met yesterday, they found that there was only one objectionable clause in the Sheppey Gas Bill; and by its excision, and a declaration that the preamble was proved, the members found themselves relieved of all the Bills in their list.

Settlement of the Croydon Gas Bill. It was stated in the lobby on Thursday that the Bill of the Croydon Gas Company was going forward unopposed; the little opposition having been completely satisfied. It would have been a matter for surprise if the reasonable proposals of the measure (which were set forth in our issue for Jan. 12 and again at the Company's meeting) had stimulated any really serious objection on the part of the Local Authorities. The principal body concerned—the Croydon Corporation—practically accepted the Bill as originally drawn; and it is understood that they only required certain verbal alterations, which, when made, did not appreciably alter the effect of the clauses. The petitions lodged against the Bill emanated from the Carshalton District and Rural Councils, and more, it would seem, for the purpose of obtaining, in set terms, a revision of a stipulation incorporated in the Company's Act of 1894, as to the price of gas in the Carshalton district (in view of the approaching termination of that agreement) than from any want of confidence in the Company's fair treatment. This needs a little explanation. The Company took over the Carshalton gas undertaking in 1894; and, in the Act then passed, a clause was inserted limiting the Company to an excess price in the Carshalton area of 1s. over the charge in Croydon. At the instance of the Croydon Corporation, a provision was also included in the Act which prevented, for a period of ten years, the Company from reducing the price in Carshalton to less than 6d. per 1000 cubic feet above that charged in Croydon. The object of the Corporation was, of course, the protection of the Croydon consumers. However, the period elapses in July next; and, in view of the fact that the consumption in Carshalton has been increasing in an extremely satisfactory manner, there is little doubt the Directors would then have taken into consideration the question of bringing about a further reduction at an early date. The suggestion of the Carshalton Authorities, and agreement to which has been the means of withdrawing their opposition, is that a clause should be inserted in the present Bill making compulsory a reduction of 3d. per 1000 cubic feet from July next, and a further 3d., or such sum as may be necessary to bring the price to the level of that in Croydon, not later than three years from July 1 next. The manner in which the Bill has been dealt with is one for general congratulation, as it evidences the confidence which subsists between the Local Authorities and the Company. The history of the latter shows that their attitude to the Authorities and the consumers has been a fair and even a generous one. Undoubtedly, the Company have had a favourable Act under which to work in the past; but they have never taken full advantage of their powers.

14-Candle Gas for Tynemouth. The withdrawal of the proposal to extend the limits of supply to Earsdon in deference to the wishes of the Local Authority, left the Tynemouth Gas Company's Bill with only one opponent—the Tynemouth Corporation—on its appearance before the Earl of Crewe's Committee on Friday. Fourteen-candle gas (as against the existing 16-candle), and the pendent points as to the method of testing, and the maximum price of 3s. 4d. per 1000 cubic feet, are the questions around which the opposition began to mercilessly beat as soon as they secured the right to command the attention of Mr. W. Hardie, the Engineer and Manager of the Company, when in the witness chair on Friday. The additional capital of £150,000, with £50,000 loan, was not hammered at so much—Mr. Hardie's detailed figures serving as an almost conclusive proof that the Company were not asking for too much. On the question of the reduction in the illuminating power of the gas to 14 candles, it is interesting to learn from Lord Robert Cecil that no less than 37 companies and local authorities have followed the precedent of the South Metropolitan Company in applications to Parliament. The tactics of the opposition on Friday showed that what was predicted last week would be the case—that the sitting of the Departmental Committee on Metropolitan gas testing and other matters, and the conforming in the previous week of the South Shields testing of 14-candle gas to the decision (whatever it may be) of that Committee, would be made the most of in such cases as this one—came true on this first opportunity. As to the charge for gas, the Company promise a reduction to 2s. 1d. as the result of the lowering of the candle power. The case for the Bill was continued yesterday, when Sir George Livesey, who had to get away to the Board of Trade inquiry, was examined first. The Corporation of Tynemouth were petitioning on all points; and one of their requests was that the Company should be required to supply pure coal gas, and not a mixture of coal and water gas. Sir George thought this was a very proper thing, or rather he saw no objection to it; and the Committee seemed to be rather impressed with his view. With all respect to Sir George, it is not, looked at broadly, at all a thing to be desired that gas suppliers should have their hands tied in this way. Mr. W. Doig Gibb followed on behalf of the promoters; and then the case for the opposition was taken—Mr. E. Herbert Stevenson being the first witness. He produced a curious clause, which, to make it more curious still, was, in view of the evidence of Sir George Livesey, accepted by the promoters. It is to the effect that the composition of the 14-candle gas is to remain the same as that at present supplied, and that there is to be no enrichment added after the holders. The first part of the clause, it seems to us, absolutely precludes the use of water gas. A great point was made by the opposition of the fact that this was the first time there had been a contest on a reduction of illuminating power by a maximum-price gas company. Of course, in the case of a sliding-scale company, the consumers have a guarantee that the company cannot raise the price without a corresponding reduction of dividend; but with a maximum price, it was argued, there was no such guarantee. The Corporation asked that the maximum price should be put at the absurdly low figure of 2s. 6d. The Committee's decision, which was very favourable to the Company, was given late in the afternoon. They granted them the whole of the capital asked for, and the 14-candle gas.

It was stipulated, however, that the debenture stock should be subjected to the auction clauses, and, secondly, that some provision should be made for limiting the reserve fund to the amount of capital raised in the same way as in the case of sliding-scale companies. On the question of testing the 14-candle gas, the South Shields clause was inserted—the method of testing to abide the decision of the Board of Trade Committee. The maximum price, too, was reduced by 4d. to 3s. per 1000 cubic feet.

Sutton Gas Bill. The Sutton Gas Company's Bill was the only one fought out before Mr. Cremer's Committee last week; and it was apparent throughout that the local interest in the proposals was strong. The District Council were the only opponents; and their objections were chiefly found in the suggested use of a new site for manufacturing purposes, the amount of the new capital, and the initial prices asked for on the substitution of the sliding-scale for the maximum price arrangement. No opposition was offered to the conversion of the existing capital on a 5 per cent. basis. There was nothing worth special observation about either the case for or against the Bill, excepting the rapid growth of the Company's gas business by 112 per cent. in the past twelve years, which alone is sufficient justification for all they proposed. The Chairman of the Company (Mr. F. Budgen) and Mr. Charles Hunt were the witnesses for the Bill; and Mr. Mead Robbins, the Engineer and Manager of the Company, was also present. Mr. E. H. Stevenson presented the principal evidence for the opposition. In the result, the conversion of the capital, and the utilization of the new site for manufacture were allowed. The proposed additional capital of £75,000, with one-third borrowing powers, was cut down to £60,000 and one-third loan. The Committee, however, who had some difficulty in comprehending the point, would not allow the difference between one-quarter and one-third loan on the existing capital. On this the opposition appeared highly elated, though the refusal is distinctly against the interests of the consumers. and against what has become the practice of Parliament in this respect, The borrowing powers are to be subject to the auction clauses. The proposed initial prices of 3s. 6d. for Sutton and Cheam and 4s. for Banstead were reduced to 3s. 2d. and 3s. 8d. respectively, which is an exact division of the difference between Mr. Stevenson and the Bill. The renewal fund was also limited to 5 per cent.

Purchase Clauses—Bishop's Stortford. The first Bill to be taken by Mr. Tennant's Committee last Tuesday was that promoted by the Bishop s Stortford Company, who, old as the concern is and prosperous, have only this session applied to Parliament for statutory powers. The powers sought, and the position of the undertaking, are set out in the opening speech of Mr. Baggallay, K.C., as reported elsewhere. In every respect the Company had a good case to present for the consideration of the Committee. There was no complaint made in the petitions regarding their conduct or their supply. But the District Council, in their petition, asked for the insertion of a purchase clause in the Bill, which is becoming the common practice of Local Authorities in the case of non-statutory concerns; and every addition to precedents makes it more difficult to resist the application. But great care has to be taken by the legal advisers and experts of such companies that no injustice is done to their clients, and to insist that a limit shall be put upon the time within which the power obtained may be exercised. In this particular case, the District Council have had a desire for the possession of the undertaking for some years; but the difficulty has been to get them to do what was right and proper—agree to the purchase price being assessed by arbitration under the Lands Clauses Act. Instead they had offered a ridiculously small price for the concern. Curiously, precisely what they refused to do before, they agreed to do after the case had occupied the attention of the Committee for a brief space. A purchase clause has been embodied in the Bill, providing for arbitration under the Lands Clauses Act, with an addition of 2½ per cent. for re-investment, and compensation for officers and servants of the Company whose employment may not be continued under the Council. The Company are to be at liberty to borrow £4000 until purchase is completed. The Council are to apply for the necessary powers next session. Two or three changes were made in the Bill; and, after the adjustment of clauses, it was permitted to proceed. The shortening of the case by the agreement gave no opportunity for the evidence to be submitted of the various expert engineers who had been engaged. Mr. H. E. Jones, Mr. Corbet Woodall, and Mr. Joseph Cash were for the Company; and Mr. E. H. Stevenson for the Council. On this Bill, Mr. Jeeves, who recently relinquished the Town Clerkship of Leeds, made his first appearance as Counsel before a Parliamentary Committee. Some of the old practitioners at the Bar personally gave him a cordial welcome.

Chippenham. It was announced in last week's notes, in the reference to the proceedings on the Chippenham Gas Company's Bill, that there was a probability that the measure would go forward with a purchase clause embodied; the Company being a non-statutory one, and the Local Authority appearing to have a desire to purchase, and the Company not unwilling to sell on proper terms. The proceedings were postponed with the view of seeing whether the terms of a purchase clause could be arranged; but on the resumption of the discussion on Wednesday, it was found that, instead of agreement, both parties came up with clauses varying in essential particulars. The result was long arguments on the part of Counsel, who were being advised by Mr. W. A. M'Intosh Valon for the Company, and by Mr. E. H. Stevenson for the Corporation. Mr. Corbet Woodall had also been retained to support the Company's case. The great bone of contention between the parties was that the Corporation maintained that they had some powers granted to them by part of an old Act not repealed, which their predecessors obtained in 1834, and which virtually prohibited the Company from claiming statutory powers. Further, that as the Company had built their works upon land leased them by the Corporation (in addition to the fact that the Corporation had this old Act), this put the Company in the position of licensees. This Mr. Valon, as representing the Company, stoutly contested before the Bill reached the parliamentary stage; and it was now argued by Counsel before the Committee that the powers granted to the Corporation at that particular time were practically only such as were granted to all corporations and local authorities by the Public Health Act, which enable them to provide for themselves or contract for the public lighting of the town. The arguments are too lengthy for compression into a short space; but the upshot was that the Committee accepted the Company's clause, reserving the rights of both parties for the consideration of the Arbitrator. Besides providing for the transfer of the undertaking, the Company's clause secures compensation to servants. After the rejection of the Corporation clause (which would have virtually directed the Arbitrator to treat the concern at an old-iron price, without compensation to the Company for goodwill or to servants, or, indeed, taking anything into consideration which is usual in transfers of this kind), the Corporation did not think it worth while to persevere further with their opposition. The Bill was therefore passed by the Committee as it stood, granting the Company 10 per cent. on their original capital of £10,000 (£8500 of which was paid up and £1500 of which was subscribed out of profits in lieu of dividing them), and a further sum of £6000 capitalized profits at 5 per cent., £3100 of which was already expended on the works and £2900 carried to the new Company out of undivided profits to be used as working capital. The Committee also passed the standard price of 4s. asked for by the Company within the present borough, or within the limits of the borough at any time it might be extended, with 6d. additional outside. The new capital asked by the Company was £25,000 share; one-third borrowing powers, £8333; and borrowing powers in respect of the original capital, £5333—making altogether £38,666. The Company have therefore, by a plucky resistance to the Corporation, who sought to practically confiscate the concern, succeeded in securing everything that their Bill contemplated in the first instance, together with a grant of lands for the transfer of the works to a new site in the near future, and a large extension of their district. The Company agreed to give the Wiltshire County Council seven days' notice (instead of three) of the opening of roads, excepting in cases of emergency; but the Committee refused the Council their petition that the Company should be made responsible for any damage that might occur to their mains through the use of the Council's steam-rollers.

Wellington (Somerset). The Bill promoted by the Wellington (Somerset) Gas Company has passed, with many others, into the unopposed list; and it was examined by the Unopposed Committee, presided over by Mr. J. W. Lowther, on Friday afternoon. It proposes the incorporation of the Company, asks for £14,000 of original capital at 10 per cent., £3500 of improvement stock at 5 per cent., £15,000 of new capital at 7 per cent., and one-third borrowing powers extending over the new and old capital—making new capital to the extent of £25,833. The standard price is fixed at 4s. 3d. per 1000 cubic feet. The Local Authority had previously withdrawn a threatened opposition; being satisfied in an interview with the Company on all questions of difference, and the Company consenting to insert a suitable purchase clause, giving the Corporation power to purchase should they desire to do so. At present, however, there seems no likelihood of this happening. The Company thus secure an excellent Bill; the Committee agreeing without alteration to the promoters' proposals as being reasonable and proper. Mr. W. A. M'Intosh Valon has been advising the Company throughout the promotion and progress of the Bill.

Repayment of the Costs of Bills. Lord Balfour of Burleigh had before him last Tuesday the Unopposed Bill of the Appleby Corporation, which is to empower them, among other things, to buy by consent the undertaking of the local Gas and Coal Company. It is only a small affair; the share capital of the Company consisting of £4000, with a loan of £350. The measure provides for the fixing of the purchase price by a single Arbitrator (before whom only one Counsel and two expert witnesses are to appear on either side); and in addition to the purchase money, £2000 for extension and improvement, and £1000 for working capital. The Agent for the Bill (Mr. Baker) raised a point before his Lordship regarding the period for the repayment of the costs of the Bill. He said he understood it was to be from the passing of the Act; but he asked that it might, if possible, be from the date of the taxation of costs. He pointed out that the Bill might be passed towards the end of July, and nothing could be done perhaps towards the taxation of costs until the following spring, which took eight or nine months out of the five years allowed, and rendered the period very short for repayment. No satisfaction was obtained from his Lordship, whose opinion was that municipal corporations had brought this upon themselves by their method of interpreting the words of the Act. He did not hold out the slightest encouragement for any relaxation.

Littlestone-on-Sea Water. The final Bill which Mr. Fison and his colleagues had to consider before they completed the hearing of the case for and against the Chippenham Gas Bill was that bearing the title of the Littlestone-on-Sea and District Water Bill. The importance of the measure was greater than its title would lead one to suppose; but only on one point is its interest anything more than local. The measure was the promotion of a gentleman who has expended a considerable sum of money in developing Littlestone and Greatstone; and among his beneficent schemes has been the provision of a water supply. The time has arrived when fresh works were required, and on a far larger scale than those which have hitherto sufficed for the small district. The source of supply which he acquired is ample for the surrounding towns and villages. Therefore the present Bill was lodged; and, among other places, New Romney and Lydd were included in the scheme. The New Romney Corporation objected; and it was their objection that brought the measure before the Committee. Evidence made it perfectly clear that, instead of being hostile to the project, the Corporation should have blessed the promoter. This was manifestly the view of Mr. Fison and his colleagues, who sent the Corporation away with the reproof ringing in their ears that it was the opinion of the Committee that they had neglected their duty in not providing a proper water supply before; and therefore they would give to the new Company, who were willing and prepared to carry out a scheme, the powers they asked for. The works are to be completed within two years. Mr. A. F. Phillips, Mr. W. B. Bryan, and Mr. W. Whittaker were among the experts retained by the Company.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 8.

(*Before* Mr. FISON, *Chairman*, Mr. SOAMES, Mr. R. LUCAS, and Mr. RUNCIMAN.)

SOUTH SHIELDS GAS BILL.

This Bill came again before the Committee to-day for the final adjustment of clauses.

Mr. CRIPPS said the promoters had not quite arrived at an agreement with the Harton Coal Company, and, therefore, no clause was submitted; the hope being that an agreement would be arrived at.

Mr. PRITT said the parties had had a long conference, and it had been decided that it would not be fair to prejudice either side by putting in a clause at present. There was every probability that they would agree.

The CHAIRMAN: You say you are practically agreed?

Mr. PRITT said they were; but one or two outstanding details still required adjustment.

On behalf of the South Shields Corporation, as the testing clauses were formally receiving the assent of the Committee, it was suggested that the testing should be for pressure, purity, and candle power.

Mr. CRIPPS considered this unnecessary, but offered no opposition. The alteration was accordingly made.

The new testing clause provided that, whenever an official test was made, a representative of the Gas Company should be present. It was pointed out that this would mean that if an official of the Company did not put in an appearance no official test could be made; and the promoters agreed to a form of words setting forth that an hour's notice should be given to the Company whenever an official test was to be made. In that case, it was urged, if the representative of the Company did not put in an appearance, the test would still be official; whereas, in the other event, if the officer of the Company was not present, no official test would take place at all.

The Committee assented to the proposal that an hour's notice should be given to the Company whenever an official test was to be made.

The CHAIRMAN said that if any dispute arose as to proper notification, the question could be decided by the Judge before whom the case would be taken.

The preamble of the Bill, as amended, was read and agreed to, as were the clauses and amendments; and the Bill was ordered to be reported for third reading.

*** Attention has been called to an error in our report of the proceedings on this Bill in the "JOURNAL" last week, p. 632. About the middle of the second column of the page, a statement is given as emanating from the Chairman, who is made to say: "I do not know whether the Home Office Committee on Power Gas might give a hint," &c. The words "Home Office" and "Power Gas" should not have appeared in this connection; and evidently the reporter must have been misled into inserting the words by a question that had previously been addressed to Mr. Duxbury, the witness, in cross-examination by Mr. Freeman, who asked: "Do you know that at the present time the whole question of power gas is being considered by a Departmental Committee at the Home Office?" Witness answered: "That is so, I believe." As a matter of fact, from inquiries since made, we learn that no such Committee as that suggested is even at present contemplated.

HOUSE OF LORDS COMMITTEE.

Friday, March 11.

(*Before the Earl of* CREWE, *Chairman*, *Lord* HYLTON, *Earl* STAMFORD, *Lord* ROMILY, *and Lord* CAREW.)

TYNEMOUTH GAS BILL.

The Tynemouth Gas Company by this Bill seek authority to increase their capital, and also to lower the illuminating power of the gas.

The promoters were represented by Lord ROBERT CECIL, K.C., Mr. HONORATUS LLOYD, K.C., Mr. HANS HAMILTON, and Mr. EDWARD SHORTT. A petition against the Bill was lodged by the Tynemouth Corporation, who were represented by the Hon. J. D. FITZGERALD, K.C., and Mr. ACWORTH.

Lord ROBERT CECIL, in opening, said originally the Company proposed to extend their limit of supply to a place called Earsdon; but Earsdon having objected, this proposal had been taken out of the Bill. There was also some opposition from Whitley and Monkseaton; but they had agreed. This left the Tynemouth Corporation as the only opponents to the Bill. The Company were asking for £150,000 additional share capital and £50,000 loan capital; making a total addition of £200,000. Before 1897, they had a share capital of £70,000, and a loan capital of £17,500. The share capital had been raised from time to time under different conditions. In 1897, the consolidated share capital amounted to £118,742. To this, was added a new share capital of £75,000; making a total of £193,743. The loan capital was increased from £17,500 to £42,500. They, therefore, proposed to ask their Lordships to about double their existing capital. The population of the district served was increasing very rapidly. Tynemouth was practically a seaside suburb of Newcastle. At Whitley, in one season there had been 30 per cent. actual increase in population. But this was not the main consideration, which, of course, was what had been the increase in gas consumption. As to this, the increase had been exceedingly rapid. It might be accounted for in various ways. The Company were still introducing slot-meters all over their system. These meters were exceedingly popular; the consumption representing in value some £20,000. After showing that the actual increase in the consumption had been from 97 millions in 1873 to 401 millions in 1903, Counsel dealt with the reasons for which it was proposed to reduce the illuminating power from 16 to 14 candles. The ordinary coal of Northumberland would not give gas of more than 14-candle power; and therefore, if they were compelled to supply 16-candle power gas, they must either use cannel—which, as a comparatively rare product, was not practicable—or they must enrich the gas by the use of some spirit of the nature of benzine. They were bound, however, owing to the competition with the electric light, owned by the Corporation, to supply gas cheaply; and if they obtained this clause of the Bill, they would be able to make another reduction of price (in addition to the two other reductions, amounting to 3d. per 1000 cubic feet, made last year and this), which would bring the charge to 2s. 1d. per 1000 cubic feet. The rapid growth in the use of incandescent burners—for which 14-candle power gas amply sufficed—and the fact that the lower candle power was sufficient for all purposes of cooking, heating, and power, were further reasons why the reduction should be made. Following the precedent set in the case of the South Metropolitan Gas Company in 1897, when a reduction from 16-candle power to 14 candles was granted, the high standard power of gas had been substantially abandoned by Parliament. The precedent had already been followed in the case of 37 gas companies and local authorities who had applied to Parliament.

Mr. *W. Hardie*, the Engineer and Manager of the Company, said the actual capital was £193,742, and the amount borrowed was £42,500; making a total of £236,242. The Company had, however, overspent their capital to the extent of £13,502 11s. 3d. The introduction of slot-meter installations was now a gigantic success. Dealing with the estimates for the next ten years, witness assumed that in this period the consumption of gas would be doubled, and that, as a consequence, they would require about double capital. His estimate of £200,000 included the following items—to complete the second section of the new works, £30,000; low-level railway, £4000; tar and liquor wells, locomotive, £1000; two gasholders, £50,000; slot-meter installation, £24,000 (as against £5200 for the last four years); ordinary meters and stoves, £12,000; new mains, £31,000; remodelling old section of works, £26,000; 16 acres of land, at £150 per acre, £2400. Witness gave the population of Tynemouth as follows: 1891, 46,000; 1901, 51,000. The estimated population at the present time was at least 53,000. The population of Whitley and Monkseaton in 1891 was 3008; in 1901, 7705; and now (estimated), 11,000. This made a total population catered for of 64,000. The price of gas from 1867 to 1872 was the maximum charge of 4s. per 1000 cubic feet; from 1872 to 1875, 4s.; from 1875 to 1878, 3s. 6d.; from 1878 to 1880, 3s. 3d.; from 1880 to 1881, 3s.; from 1881 to 1882, 2s. 9d.; from 1882 to 1883, 2s. 6d.; and from 1883 to 1897, 2s. 3d. When the illuminating power was reduced from 16 to 14 candles, another penny reduction would take place; and there would be a further reduction of a penny—making the prospective charge 2s. 1d. per 1000 cubic feet. With reference to the only petitioners' statement, that the maximum price of 3s. 4d. was "far too high, particularly in view of the price of coal in the district," this maximum was fixed by Parliament in 1897, when the price was 7s. 2¾d. per ton; whereas the average price at present was 9s. 9½d. As for the method of testing the gas, they had not had one complaint on this ground in his whole experience of twenty-four years.

Mr. ACWORTH said the Act which enabled the South Metropolitan Company to reduce their candle power prescribed that they should use a certain method of testing. Since then, a Committee had been appointed to consider the best means of testing 14-candle power gas, because the method hitherto used for testing 16-candle gas was not wholly scientific as applied to 14-candle gas without change. In the case of the South Shields Bill, it was decided, after a good deal of discussion, that the gas should be tested by the method in use in the Metropolis.

Lord ROBERT CECIL said he could not accept the view that what was suitable for a large concern like the South Metropolitan Company was necessarily the best for a small undertaking; and he would have to see the clause proposed to be inserted before he could agree.

The CHAIRMAN: South Shields is more relevant.

Lord ROBERT CECIL: South Shields is certainly relevant; but I am told that in that case they were attacked for their administration.

Mr. ACWORTH said he was in the South Shields case, and he did not think the question of administration affected the decision. The Committee did not see why the South Metropolitan case, because it was Metropolitan, should not be applied to South Shields.

In cross-examination by Mr. ACWORTH, witness said the Company had since 1897 spent on new works £55,000. For this, they had put in 192 mouthpieces; making 536 altogether. He denied that the present retorts would make 3½ million cubic feet of gas per day; their make was only 2½ millions. The new mouthpieces produced about 6500 feet each. The old mouthpieces, they hoped, would produce the same when the house was re-modelled. The tar and liquor wells would hold about 200,000 gallons. He disagreed with the view that the district was "saturated;" and though the diminished rate of increase in the last three years suggested this conclusion, figures for so short a period were not a reliable basis for calculation. He could not accept the view, either, that the increase in the stream of consumption on the slot-meter system was exhausted.

Mr. ACWORTH: Turning to the question of the price of gas, the present maximum is 3s. 4d. per 1000 cubic feet, and the present charge 2s. 3d. You propose to bring it down in any case to 2s. 2d.?

Witness: Yes.

And you are going to reduce the cost of production (by the introduction of 14-candle power) so as to effect a saving of 3d.?—We are going to sell as cheaply as possible.

What do you want a margin of 1s. 5d. for?—To meet emergencies, so that the shareholders should not be handicapped unfairly.

Supposing that you did not need to spend the money you say you are going to spend, and you did not get any increased net revenue, because the consumption had not increased, there would be a heavier capital charge to be borne?—Yes.

And if you did that, it might be desirable, from you point of view, to have a big margin of price to put up?—Yes.

But would it not be hard on the consumer?—Yes, I think it would be very hard. Witness, continuing, said it was correct that they had a surplus on the last year's working of £4500, and that they carried £1750 to the reserve fund, and so put it at its maximum.

Do you still say that, with this immense balance, it would be a hardship to reduce the maximum price?—No; I say the maximum has never worked as a hardship on the consumer.

I suggest to you that for lighting purposes 14-candle power is exactly one-eighth worse than 16-candle power, provided the best ordinary burners are used in both cases?—I agree.

In further reply, witness went on to say that if a customer had a bad burner, by giving him a good one, in many cases they could make up the difference. They did not propose to give the Corporation new burners for the street-lamps.

Mr. *A. Whitehorn*, Clerk to the Monkseaton and Whitley District Council, gave evidence on behalf of that body in support of the Bill.

The further hearing of the case was then adjourned till yesterday.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 8.

(*Before* Mr. CREMER, *Chairman*, *the* Hon. S. F. ORMSBY-GORE, and Captain ELLICE.)

SUTTON GAS BILL.

Under this Bill, authority was sought by the Sutton Gas Company to increase their capital, to construct new works on land already acquired, and for various other purposes.

Mr. BALFOUR BROWNE, K.C., and Mr. G. J. TALBOT appeared for the promoters; while the only petitioners in opposition (the Sutton Urban District Council) were represented by Mr. SHIRESS-WILL, K.C., and Mr. C. C. HUTCHINSON.

Mr. BALFOUR BROWNE said the Company was formed in 1857, under the Limited Liability Acts; but in 1876 they obtained an Act authorizing the manufacture of gas on the present site—the limits of supply being defined as the parishes of Sutton, Cheam, and Banstead. The capital was fixed at £60,000. The whole of this had been raised, with the exception of £5904, which was being called up for works already completed. They also obtained power in the Act to borrow £13,750. The price of gas was not to exceed 5s. 10d. per 1000 cubic feet in Cheam and Sutton, and 6s. 4d. in Banstead. The district was growing, and had grown, very rapidly; and, the Company having reached the end of their tether, it was necessary to come to Parliament. In 1876, the rateable value of the district was £39,485, the population 6770, and the number of inhabited houses 1231. To-day the rateable value was £131,824, the population being 17,000, and the number of inhabited houses 3300. The sale of gas had practically doubled between 1894 and 1903; the figure for the latter year being 160 million cubic feet. On the existing site, the works could not be extended; the ground being fully occupied. But the Company had purchased two pieces of land adjoining, on which they sought power to manufacture gas. There were a number of cottages near this land, the occupiers and owners of which, in a memorial to the Urban District Council, alleged that they would be injured by the construction of the new works. Since the erection of the existing works, however, a number of houses of similar character to those now proposed had been built as close to the works as those in question. No complaint had been received from them; and, consequently, it seemed as if the existence of gas-works did no harm to this class of property. It would be utterly absurd therefore to put the consumers to the very large expense which would be entailed by abandoning the present site, and purchasing land elsewhere for the erection of new plant. Under clause 8 of the Bill, it was proposed to convert the capital into 5 per cent. stock. Authority was also sought to raise £75,000 additional, with borrowing power as to one-third more; and the evidence would show that such was the growth of the district that this sum would probably be expended in from twelve to fifteen years. Comparing this Company with other gas undertakings in the neighbourhood, such as those at Mitcham, Kingston, Epsom, and Reigate, it would be seen that they were serving the public exceedingly well. At least £5000 per annum had been spent on capital account for years past. The Urban District Council objected to the proposed borrowing powers, and urged that the loan capital should be raised under the auction clauses like the share capital. The object of raising share capital by auction was to obtain it at the cheapest rate. But the shareholders had no object in raising loan capital at a high rate; and therefore it would be absurd to put loan capital up to auction. Another proposal was to substitute the standard price and sliding-scale arrangement for the present maximum price method under which the Company worked; the only question being as to what was a fair standard. The Company asked that the figure should be 3s. 6d. for Sutton and Cheam, and 4s. for Banstead. In this connection, Counsel pointed out that in 1901 the price of coal, as against the average of 14s. per ton, went up to 23s. 11d.; the result being that the Company had to charge 3s. 10d. per 1000 cubic feet for gas. They should not be punished for a fortuitous rise like this; and they could not be sure that a coal famine would not occur again. Hence it was submitted that 3s. 6d. and 4s. were fair. A minor matter was the provision under which the borrowing power in respect of the share capital already authorized would be raised from the proportion of one-fourth to the proportion of one-third, which was usual now. The only other matter was the establishment of a renewal fund to which a certain sum would be allocated each year, for the purpose of defraying the cost of renewing the works as such renewing became necessary; the object being to prevent a heavy expenditure upon any particular renewal falling on one year. Counsel concluded by referring in detail to the petition against the Bill.

Mr. *F. Budgen*, Chairman of the Company, in reply to Mr. TALBOT, gave evidence bearing out Mr. Balfour Browne's statement. In regard to the coal supply, the Company were dependent on the London Brighton and South Coast Railway, and they had to cart from the station to the works at a cost of 1s. per ton. In 1901, when the price of coal rose to 23s. 11d. a ton, they were unwilling to raise the price of gas more than 6d. per 1000 cubic feet; but this sum was not sufficient, and they had to draw £600 out of revenue account to help to meet the extra expense.

In cross-examination by Mr. SHIRESS-WILL, witness said the Company had £5900 of capital unissued and £7000 of undivided revenue. The expenditure for the last few years had been about £5000 per annum. It was very unusual to issue loan capital by auction. He objected to the interest being limited to 4 per cent.

Mr. SHIRESS-WILL: If you do not limit the interest to 4 per cent., could you not allow 5 per cent. and divide the 5 per cent. debenture security among your shareholders?

Witness: It would be possible to do so. Witness went on to say that, with regard to the standard price, he agreed that at present the price charged for gas was 3s. 4d. per 1000 cubic feet, or, less 6d. discount if the account were paid in a month, 2s. 10d.

Mr. SHIRESS-WILL: It pays you to supply gas at 2s. 10d.?

Witness: Yes, at the present time.

Why do you propose to put it up to 3s. 6d. as named in the Bill?—Well, only three years ago we had famine prices for coal; and we found that 3s. 10d. subject to the discount of 6d. was insufficient.

In further cross-examination, witness said that on the average in the last five years gas had been invoiced at 3s. 6d. subject to the discount of 6d. He would neither admit nor deny that some money from revenue might have been devoted to capital purposes. Asked whether he could point to another works where the capital expenditure had been so low as £458 per million cubic feet sold, he mentioned Reigate. He did not regard the renewal fund as a barrier between the consumer and cheap gas. One clause of the Bill said that the Company might contract with any person for a supply of gas on such terms and conditions as to price, &c., as might be agreed upon. Counsel suggested that this would enable them to throw overboard the standard price, and make whatever terms they chose. Witness thought it was only intended to enable the Company to make reductions in special circumstances.

Mr. *Charles Hunt*, examined by Mr. TALBOT, stated that, when the retort-houses were fully filled and at work, their total capacity would be about 1,571,000 cubic feet daily, or about double what was required. They were at present worked by hand; but the time had arrived when they should be fitted with modern machinery, and that was about to be supplied. The gasholders had a capacity of 1,400,000 cubic feet, which also was about double the storage needed. There were, however, some deficiencies in the works. The boilers were too small, the purifiers had no covering, there was insufficient covered coal storage, and additional workshops and sulphate plant was wanted. The sale of gas had risen without check from 70 million cubic feet in 1891 to 148 millions in 1903—an increase of 112 per cent. In the first half of the period, the compound interest was 5 per cent.; in the last half, 7¾ per cent.; in the last four years, 8¼ per cent.; and in the last three years, 9 per cent. Assuming the increase of 8¼ per cent. to continue, there would be an increased consumption at the end of twelve years of 232 million cubic feet, which, at £600 per million, meant an outlay of £139,200. Sutton was rapidly increasing; the Company having frequent applications for extensions of mains. One such application now before them would involve the laying of about 2 miles of main, and an addition of 140 to 160 consumers. Deducting £21,300 for the works in excess of the demand, left £117,900. Of this sum, £22,700 would have to be spent very soon to bring the other portion of the manufacturing plant up to the level of the storage; and his estimate of the requirements for mains and meters, including prepayment, during the next twelve years was £55,000; so that there would be £40,200 for further extensions of the works and to provide stoves for ordinary consumers. The standard price should be one which would secure the shareholders from risk of loss of standard dividend by reason of any great increase in the price of coal, over which they had no control whatever. On the question of management, they must take their chance. Having regard to this, he thought 3s. 6d. per 1000 cubic feet a reasonable standard; it would compare well with neighbouring places.

Wednesday, March 9.

The case for the promoters having been concluded, evidence was called for the petitioners.

Mr. *Crook*, the Chairman of the Sutton Urban District Council, said the objection of this body with regard to the additional lands was that if the manufacture of gas took place there, and in particular if residuals were dealt with there, a very serious nuisance would be created. The Council would not object to gas being stored there. They felt strongly with regard to the standard price. For some years the price charged to consumers had, in fact, been 2s. 10d. per 1000 cubic feet; and they therefore considered that a standard price of 3s. 6d. without a discount would be excessive and unnecessarily high. They also thought the capital powers proposed were excessive, that the interest on the loan capital should be limited, and that the capital should be issued by auction.

In cross-examination, Mr. BALFOUR BROWNE put it to the witness that there was no need to issue the loan capital by auction, seeing that it was the interest of the Company to raise this capital, as well as the ordinary capital, at the cheapest rate; but witness adhered to his opinion that it should be issued by auction.

Mr. *Windibank*, a builder of Sutton, who got up the memorial which had been presented to the Council in opposition to the proposal to extend the gas-works in the area scheduled, said there was a strong feeling that the land in question would be used for the manufacture of chemicals, and would thus cause a nuisance. The Company were not at all justified in asking for so much capital, seeing that in many of the houses now being built in the district wires for the supply of electricity were being laid, which caused him to anticipate that this means of illumination would be adopted largely in the future.

Mr. *E. H. Stevenson* said the balance-sheets of the Company for some

time past showed that they had carried forward from half year to half years sums which were constantly increasing, and which should have gone to reduce the price of gas. In five or six years, these sums had reached about £7000. The Company had overdrawn their capital account at a time when they had capital not called up, which was not a proper procedure. The new land should be used only for storage purposes and workshops. He agreed that the land was most convenient and suitable for ordinary gas purposes; but the Company would not require land for manufacturing works for the next ten or fifteen years. The retort-houses and gasholder capacity were double what the Company at present required. In estimating the capital requirements of the Company, he took the increase at 7 per cent. for ten years, which would give an additional consumption of 136 million cubic feet; and this, at a capital expenditure of £600 per million, meant £81,600. In fixing the standard price, he thought 2d. should be allowed as a margin. They admitted practically that they could supply at 2s. 8d. per 1000 cubic feet because when last the net price was 2s. 10d. they spent at least 2d. more than they ought to have done on wear and tear; the total figure for this item being 8½d. He therefore thought the standard should be 2s. 10d. This would allow the Company to pay their full dividends and carry forward an amount which would relieve them from any pressure that might arise in consequence of an increase in the price of coal. The Company should raise their money at the cheapest rate; and for this reason the loan capital should be issued subject to the auction clauses. The renewal fund should not be more than 5 per cent. of the paid-up capital, because the insurance and the renewal funds took the place of the old insurance fund (which amounted to 10 per cent.); and therefore each of these funds should not exceed 5 per cent. of the paid-up capital.

Counsel having made speeches,

The Committee found the preamble of the Bill proved. They fixed the capital at £60,000, with the usual borrowing powers as to one-third more, but allowed no additional borrowing powers in respect to the old capital. They directed that borrowed capital should be raised by auction. The standard price was put at 3s. 2d. in Sutton and Cheam, and 3s. 8d. in Banstead; and the renewal fund was to amount to not more than 5 per cent. of the paid-up capital.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 8.

(*Before Mr.* TENNANT, *Chairman, Mr.* PLUMMER, *Mr.* DUNCAN, *and Mr.* W. RUTHERFORD.)

BISHOPS STORTFORD AND DISTRICT GAS BILL.

The objects of this Bill are to incorporate as a statutory Company, and confer further powers on, the Bishops Stortford Gas Company.

Mr. BAGGALLAY, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. A. M. PADDON appeared for the promoters; Mr. HUTCHINSON and Mr. JEEVES represented the Bishops Stortford Urban District Council, and Mr. J. H. W. GULLY the Hadham Rural District Council.

Mr. BAGGALLAY, in opening, explained that the promoters were a limited liability Company serving the town of Bishops Stortford and the neighbourhood. They were formed in 1834. Between then and 1871 they expended on capital account £13,000; £5450 being provided by the issue of shares, £4000 by the raising of 4 per cent. debentures, and the residue from divisible profits—a perfectly legal proceeding. During the 36 years, the average dividend was £5 9s. 9d. per cent. which was much below what was allowed to statutory companies when they were first formed. In 1871, the Company was registered under the Joint-Stock Companies Acts; and down to 1899 they spent between £7700 and £7800 on capital account. The dividend paid from 1872 to 1899 averaged £8 2s 9d. per cent., and during the later years of the period it was 10 per cent. The Company had never divided more than 10 per cent. In 1899-1900, they decided to make their capital more representative of the actual amount spent. The Company was re-constituted; and two shares in the Company now promoting the Bill were issued in exchange for one share in the old concern. The amount provided out of profits, in round figures, was equal to that in the original shares. The capital was £21,700 altogether. At the time of the reconstruction, in order to ascertain whether the value of the undertaking was equal to the capital, the Company consulted Mr. H. E. Jones, who made a structural valuation which, not taking into account goodwill, fully justified the £21,700. Since 1900, there had been certain additions provided by the issue of fresh shares of £410 (with premiums of £400) and £4408 debentures; the latter being for the specific object of purchasing a small gas undertaking at Stansted. The Stansted works were in a cramped situation, where they could not expand. They could not be removed; and they were too small to enable them to be carried on satisfactorily to the consumers or profitably to the shareholders. On the advice of Mr. Jones, therefore, the Company approached the Bishops Stortford Company with a view to being taken over. The site could still be used for storing gas for the supply of the Stansted district. The capital to-day totalled £30,608. The Company had grown rapidly, and was a prosperous concern. The sale of gas had increased from 833,000 cubic feet in 1836 to 9½ millions in 1871, 25⅜ millions in 1899, 27¼ millions in 1900, 29 millions in 1901, 30 millions in 1902, and 31½ millions last year—not counting the supply of Stansted. The prices charged by the Company were 12s. 6d. per 1000 cubic feet from 1836 to 1845; between 1845 and 1877, 5s.; from 1877 to 1900, the price was gradually reduced to 3s. 9d.; in 1901, it rose to 4s. 2d., owing to the coal famine; and from 1902 until the present time it had stood at 3s. 10d., which would compare very favourably indeed with the prices charged by some of the biggest gas companies in the country. Power was asked to include in the area of supply a number of parishes, and to fix the capital of the Company at £75,000, of which £23,000 (divided into 2300 ordinary shares of £10 each) was to be regarded as original capital and £52,000 was to be additional capital. It was proposed that the interest which was now 5½ per cent. should not in the future exceed 7 per cent. (if ever it reached that amount), and that the 4 per cent. now paid on the preference shares should not exceed that figure in the future. The maximum price was to be 4s. 6d. per 1000 cubic feet in Bishops Stortford and within a mile, and 5s. 6d. in the outside area, and the illuminating power 14 candles. In order to meet the increase in the demand for gas which was expected, authority was asked to improve and enlarge the existing works.

Mr. *Ernest Barton*, one of the Directors of the Company, in reply to Mr. HONORATUS LLOYD, gave evidence in support of the Bill. The population of the present area of supply was about 10,000.

In cross-examination by Mr. HUTCHINSON, witness said the Company now sought power to supply over an area of over 90,000 acres, with a population of 24,162—about one person to every four acres, or, on the basis of one person to each house, one house for every 20 acres. In 1898, the Company received a letter from the Bishops Stortford District Council intimating that, in the interests of the ratepayers, it was desirable that the gas-works should be acquired by the Council. The Directors replied that they preferred the existing arrangement, and then passed a resolution to the effect that if the Council determined to acquire the undertaking, and would enter into a provisional contract to do so at a price to be decided by arbitration, they would convene a meeting of shareholders and recommend them to pass a special resolution agreeing to the terms.

Mr. HUTCHINSON: Do you think that the District Council would be acting in an equally fair way if they say that they will now accept?

Witness: It would not be unfair.

As you think that there is nothing unfair in so doing, I will accept.

The parties thereupon deliberated in private, after which

Mr. HUTCHINSON said: I am glad to say the Committee will be relieved from further opposition on the part of the District Council. It has been arranged that a clause shall be inserted in the Bill empowering the Council to purchase the gas-works at a price to be settled by arbitration under the Lands Clauses Act, with an addition of 2½ per cent. for re-investment and a provision for giving compensation to such officers and servants of the Company as are not employed by the Council. Instead of the maximum price mentioned in the Bill, it is arranged that there shall be a standard price of 4s. in Bishops Stortford and the immediate neighbourhood, and 5s. in the outside districts, subject to a sliding-scale. Provisions are to be inserted that the passing of the Bill shall not be taken to enhance the value of the Company's undertaking; that the Company are not to raise any further capital without the consent of the Council, but that they shall be at liberty to borrow £4000 for the purpose of carrying on the works till the purchase is completed; that the amount of capital specified in the Bill shall be reduced by £10,000—that is to say, to £65,000.

After some conversation, it was agreed that the Council should apply for a Bill in the next session of Parliament, sanctioning the purchase of the undertaking.

Mr. GULLY: Will you give us the benefit of the standard price of 5s. and the sliding-scale?

Mr. LLOYD: Yes.

The preamble was then found proved; and the Committee at once adjusted the clauses in accordance with the agreement. The Bill, as amended, was ordered to be reported for third reading.

LEGAL INTELLIGENCE.

CANTERBURY COUNTY COURT.—Tuesday, March 1.

(*Before His Honour Sir* W. LUCIUS SELFE.)

Ashby v. Herne Bay Gas Company, Limited—A Compensation Case.

This was an application under the provisions of the Workmen's Compensation Act, 1897, with regard to an injury to the back said to have been sustained by the plaintiff, a gas stoker, by which he was incapacitated from following his ordinary employment.

Mr. SIDNEY SHEA appeared for the plaintiff; and Mr. THORNE DRURY represented the Law Accident Insurance Company, by whom the action was defended.

Mr. SHEA said the accident was alleged to have taken place on Aug. 11 last year. The plaintiff had been a stoker in the Navy for ten years, and afterwards employed at the Margate Water-Works and Ramsgate Gas-Works. At the latter place he was engaged as odd man in the yard—being occasionally taken into the retort-house when one of the regular stokers was away. Mr. C. V. Bennett, the Gas Manager at Herne Bay, requiring a permanent hand in the retort-house, wrote to the foreman at Ramsgate asking him if he could recommend a man; and as the result of this, Mr. Bennett engaged the plaintiff, who commenced work at Herne Bay with the night shift on the day mentioned. At Ramsgate, for drawing the retorts the men had the assistance of a travelling platform, so that they were on a level with them; but at Herne Bay there was no such contrivance, The plaintiff was little over 5 feet in height; and when he had got half the charge out of one of the top retorts, the remaining half stuck. Plaintiff thereupon put his whole energy to the work, and then all of a sudden felt a tear in the back. He then went home, and next day the doctor ordered him to keep to his bed. When the claim for compensation was made, the Company repudiated responsibility; and hence the action. Plaintiff's wages were 31s. 6d. per week.

Plaintiff was called, and bore out Counsel's statement. He said that when he felt the pain in his back, he stopped work and left the rake in the retort, with the door open. When he saw Mr. Bennett next or the following day, the latter told him he could not do the work. Dr. Fenoulhet gave him a certificate, and he had been on the club ever since.

Cross-examined by Mr. DRURY, plaintiff said he left the Margate Water-Works because he was laid up for nine weeks with a cold.

Altogether he had been incapacitated for nine weeks and for five months. He denied that he was unable to do stoking at all, but admitted that he tried it at the Margate Gas-Works, and then got the job as odd man at Ramsgate. He did not tell Mr. Bennett that the work was too much for him. Neither did he ask to be put on lighter work in the yard; but it was offered to him, and he said he would start it on Aug. 13. He was engaged in the Ramsgate Gas-Works for three years, and had worked in the retort-house for a month at a stretch.

Mr. *Benjamin Davis*, examined by Mr. SHEA, said he was Superintendent and General Foreman at the Ramsgate Gas-Works, and had had a life-long experience with reference to gas-works. He knew the plaintiff, who was on the works for two or three years. He was put on as a day labourer, which work he carried out to his satisfaction. He used to do stoking; and the work was not too much for him. He was by no means a shirker, and worked as well as the rest of the men. He could not say whether the work at Herne Bay would be lighter or more arduous than at Ramsgate. In August, as the result of a communication received from Mr. Bennett, he recommended the plaintiff as a stoker.

Cross-examined by Mr. DRURY, witness said the plaintiff had left his service in May, as they were shortening hands; and the last time he did stoking was in February. He could not say theirs was an easier system; all stoking was hard work. They had a running platform to get up to the high retorts, which made the work easier. These were about 7 feet high.

Dr. *E. C. Fenoulhet* said the plaintiff came to see him on Aug. 12, and told him he was suffering from great pain in the back—the right side of the back in the region of the shoulder blade. Witness examined him, and found a decided swelling, and apparently great tenderness. He concluded that the plaintiff had strained the muscles and probably the soft parts of the back. He did not then think the injury would be a very serious one; but as time had gone on and neither the pain in, nor the ability to use, the arm or back had improved, in spite of every form of treatment, he concluded the injury was greater than he could discover. It was a very difficult thing in the case of the back, especially when covered by the soft parts, to ascertain the exact nature of an injury.

Cross examined by Mr. DRURY, witness said that in his opinion the plaintiff had a severe strain, and a probable rupture of the muscular fibres, and it might be ligaments as well; and these being very deep seated, it was impossible to get at them or to judge the extent of the injury except by the symptoms. He could not explain the matter further than that something had happened which he was unable to discover.

Mr. *C. Bell Keetley*, Senior Surgeon to the West London Hospital, said he examined the plaintiff last month and came to the conclusion that he had really received the injury that he said he was suffering from. He had known people who had never completely recovered from a bad sprain in the back. He felt convinced that the plaintiff was not malingering, and that he was not at present fit to work.

This closed the case for the plaintiff, and

His HONOUR intimated that he had sent for Dr. Whitehead Reid, the Medical Referee.

Mr. *C. V. Bennett*, the Gas Manager at Herne Bay, said he saw the plaintiff some hours before he left off work, and he then seemed very much distressed, and appeared to be exhausted. Subsequently the foreman informed him that the plaintiff had stopped work, and told the ganger that it was too heavy for him. This was the reason he gave witness for having broken his contract. Plaintiff did not actually ask for lighter work; but he put it in such a way as would exact a reply, and witness offered to put him on breaking oxide in the yard. He did not know anything about the accident until a fortnight afterwards, when he received a letter from the plaintiff asking what the Company would do for him.

J. T. Griggs, the Works Foreman, and *T. E. Hickson*, the leading stoker, both denied that the plaintiff had told them he had met with an accident; the latter, in cross-examination, stating that the height of the retort from the ground was 5 ft. 2 in. to the bottom of the mouthpiece.

Dr. *C. Kessick Bowes*, replying to Mr. DRURY, said he examined the plaintiff on Feb. 18. If there had been a rupture of any of the deep-seated fibres or ligaments, he would certainly have expected to find objective symptoms; but he could find no trace whatever of anything of the kind. He made tests for pain and tenderness. The plaintiff pointed to the region of the back, just below the shoulder-blade, and told him that was where he was tender. Witness manipulated him all over his back, and found that the points of tenderness varied considerably. He told witness that he could not put on his coat and waistcoat without the assistance of his wife, and she helped him. He examined him again on Feb. 24 with Dr. Preston. He undressed himself then without apparent difficulty. Witness would not have thought it possible to have done that if the man had been suffering the amount of pain and tenderness he said he was. Dr. Preston examined him on that account; and he found exactly the same state of things as witness had done. Witness therefore came to the conclusion that the man was malingering. While he was dressing, witness noticed that something dropped out of his waistcoat pocket; and he immediately stooped and picked it up quite naturally. It was only by such accidental things that it was possible to form any opinion.

Cross-examined by Mr. SHEA, witness said he was speaking of the plaintiff's present condition. He did not suggest that he had not met with an accident; it was quite impossible for him to say. Although there might not have been any outward sign of the accident, he should have expected to have found some spot of extreme tenderness. While witness was examining him he pressed as hard as possible with his stethoscope, and he would not wince; but immediately witness touched him with his fingers, he winced. He thought the man's present condition was an assumption for the purposes of the case.

Mr. *H. Octavius Preston*, M.R.C.S., gave evidence bearing out the statements of the previous witness.

Mr. DRURY said he did not feel in a position to ask his Honour to say that there had not been an accident, after the evidence of Dr. Fenoulhet; but he relied on the fact that it had not been such as to have incapacitated the plaintiff from following his employment, except for a limited period, if at all. It seemed to him that Dr. Fenoulhet, who was a gentleman of reputation, having attended the man from the beginning, was the last person who was in a good position to form an opinion as to *bona fides*. What Dr. Fenoulhet had said, he could hardly quarrel with, because he had expressed himself to be puzzled, to put it mildly, at the course which events had taken. He submitted that the question was not to be approached so much from the point of view of the medical evidence, as from what reliance should be placed in the plaintiff himself. He said he had never suffered from bodily illness before; but, in cross-examination, he was forced to admit he had been in bed for nine weeks, and then, following upon that, he was upon his club for five months. Counsel said he should be inclined to submit that these other illnesses were more serious than was supposed; and this ought to be taken into consideration in dealing with the fact as to whether the man was acting in good faith with regard to his injury. The issue was whether there had been a serious injury which would incapacitate the plaintiff for a considerable time, or only a trifling one.

Mr. SHEA said his Honour was asked to believe that the plaintiff had been guilty of the most barefaced perjury; but his tale appeared to be perfectly consistent. The previous illness which had been made so much of, consisted of a boil, which was poulticed; but the plaintiff then got in a draught, and inflammation was set up. There was no doubt that the man had suffered injury; and therefore he was entitled to compensation.

His HONOUR, in giving judgment, said that he had submitted the point to the Medical Referee as to whether the plaintiff had recovered from the injury, and whether he was able to do work as a gas stoker or anything else. This matter seemed to be material on the point of wages and the amount of compensation to be awarded. Counsel appearing for the respondents admitted that there was an accident; but his contention was that it was not a severe one. On the other side, there was the evidence of Dr. Fenoulhet, who seemed to be considerably surprised about the case, but was satisfied that the plaintiff was not malingering, and that he had not recovered. Dr. Keetley, a perfectly independent person, and of great experience, was also of opinion that he was not at present able to work. The framers of the Act of Parliament, having foreseen difficulties, had provided, for the assistance of Arbitrators who had to decide such cases, that they should be entitled to call in Medical Referees, who were appointed and paid by the State, for the purpose of reporting to the Court upon questions of this kind; and therefore he should defer making his award as to what the compensation should be, as to the past or future, until Dr. Reid had made his report. He had examined the man, and was then no doubt endeavouring to decipher the evidence of the medical gentlemen upon whom he was entitled to sit as Umpire.

Dr. Whitehead Reid's report was, after a short delay, handed in and read by his Honour. It certified that the plaintiff had recovered from the strain he received on Aug. 11, and was able to begin to undertake some light form of work, but at present was not fit for the more heavy labour of a gas stoker.

His HONOUR, to Mr. Drury: Have you anything to say as to the amount of compensation?

Mr. DRURY said he did not think he had, because it seemed to him that the point he endeavoured to make—the probability of the man being able to do light work, and not able to continue as a gas stoker—had been upheld.

His HONOUR: It is open for you to argue that I am not bound to give him the maximum compensation.

Mr. DRURY: That would only involve going over the evidence again.

Mr. SHEA pointed out that, even if his Honour allowed the applicant the maximum amount, the respondents would have power to appeal to vary it; and he suggested that 10s. a week should be fixed.

His HONOUR said that, as regarded the compensation for the past, he proposed to assess it at 13s. 6d. a week; and he did so for the reason that he thought it possible that the contract would not have been continued for any length of time, even if there had not been any accident, and 27s. a week was the full wage-earning capacity of the man. Not being obliged to award the maximum, he made this award, beginning on Aug. 24 to the last Saturday in February. This would amount to £18 2s. 3d. With regard to the future, taking into consideration the average earnings of the man, he assessed the compensation, to continue until further review, at 8s. per week; and he allowed the plaintiff costs on schedule C.

Foreign Companies and the Payment of Income-Tax.

In the King's Bench Division of the High Court of Justice on Wednesday, Mr. Justice Channell delivered judgment in the specially-stated case in which Messrs. A. Goerz and Co., Limited, appealed against a decision of the Commissioners of Income Tax for the City of London to the effect that the Company, which was not registered in the United Kingdom, was resident here for purposes of income-tax, and was therefore liable to an assessment on the annual profits. The appellants had been originally assessed at £75,000 in respect of the profits on their trading in the United Kingdom; but the Commissioners claimed £142,429, which was an assessment on the entire profits accruing to the Company in the year in question. The contention of the Crown was that the affairs of the Company were controlled and directed from the head office in London, and that therefore the Company must be regarded as "a person residing in the United Kingdom, and liable as such to be assessed, under section 2 of the Income-Tax Act, 1853, on the whole of the annual profits or gains arising or accruing from any trade, whether the same should be carried on in the United Kingdom or elsewhere." His Lordship came to the conclusion that the evidence in the case fully supported the finding of the Commissioners. Did the fact that the Company was incorporated in the late South African Republic show that its residence was necessarily there, and not elsewhere? There was no case reported in which a company incorporated in one country had been held to be resident in another; but there was also no case which had come before the Court in which a company had been

incorporated in one country and had not had its head office there. He thought the true inference here was that the appellants must be held to be resident in this country. The Company was to be found in London, and only their agents at Johannesburg. The decision of the Commissioners must therefore be affirmed, and the appeal dismissed, with costs.

Water-Rate Dispute at Knaresborough.

At the Knaresborough Petty Sessions on Wednesday, a number of the residents of Burton Leonard were summoned for non-payment of a special rate levied by the Knaresborough Rural District Council for water supplied to the village by the authority. Two cases were taken by way of test; and the other defendants agreed to be bound by the result. Mr. Laycock, for the defence, contended that it was not incumbent upon people to give notice to the District Council before having analyses made of their private supplies, if they wished to use them instead of the water provided by the Council. The two defendants whose cases had been taken had wells of their own, and were not using the public water. He also contended that in fixing the charge the Local Government Board had no power to go behind the Act of Parliament, which said that the rate should be chargeable on the net annual value and not on the gross value of the premises. The Chairman said the cases before the Court had been carefully considered, and the Bench had come to the conclusion that under section 9 of the Act of 1878, it had not been shown that the defendants had a reasonable supply of wholesome water, and therefore there was no alternative but to decide against them. With regard to the point raised as to the basis of the rate, the Bench also felt that it was perfectly clear that the Local Government Board only followed the Act of Parliament. They had a right to say what the charge should be, and the Bench had no power to override them. In reply to Mr. Laycock, the Chairman said the Bench had decided to state a case if necessary. Orders for payment were made.

Lighting Back-Passages in Liverpool.

Before Mr. Stewart, the Liverpool Stipendiary, on Friday, the Liverpool Corporation summoned the Liverpool Gas Company, under section 24 of the Gas-Works Clauses Act, 1871, for failing to supply gas to a public lamp in a passage at the rear of Livingston Avenue. Mr. F. E. Smith appeared for the Corporation; Mr. Hyslop Maxwell represented the Company. Mr. Smith said the Corporation some years ago took in hand the work of lighting the back-passages of the city; and it had been carried on up to the present time. A dispute arose between the Corporation and the Gas Company as to whether or not the latter were entitled, under their contract with the Corporation, to extra remuneration for the work of connecting with the mains the additional lamps in the passages. This dispute was the subject of legal proceedings, and a test case would be tried to decide the matter; but this had nothing to do with a specific information like the present one. The Corporation gave the ordinary notice to the Company to carry out the work, and they proceeded to do it; but because an objection was raised by the owner of the adjoining house they desisted. Mr. Maxwell submitted that this was a case in which his Worship had no jurisdiction. Disputes had gone on between the Corporation and the Company since 1897, and the test case had not yet been settled. They had supplied about 5000 lamps, and had carried out their agreement to the letter; but in regard to this particular lamp, it was in a private avenue, and the question raised was the same as that which the High Court were being asked to decide. It was as to whether it was an obligation on the Company to supply the pipes connecting the lamp with the main; their contention being that the lamp was not a public one, and that they ought not to be called upon to bear the cost. Evidence having been given in support of the Corporation's case, Mr. Alfred Hardwick said the avenue was an essentially private passage, and he objected to the lamp being lighted. Mr. Smith said the Corporation had offered, and were still ready to give, the Company an indemnity against any legal proceedings that might arise from carrying out the work, and were also willing to defend any proceedings. Mr. Maxwell said the Company were not prepared to proceed with the work. After some further argument, Mr. Stewart said he did not think the case was one in which the Company could be forced to do the work in face of the objection raised by the owner.

French General Gas Company.—The profits realized in the year 1902-3 by the Companies in which this Company are interested amounted to 1,849,502 frs. (£73,980), and interest on coupons came to 316,810 frs. (£12,672); making together 2,166,312 frs. (£86,652). The position of the Company on Aug. 31 last was as follows: Gas sold in the year, 28,519,625 cubic metres, or about 1006 million cubic feet (an increase of 1,094,752 cubic metres, or 38½ million cubic feet, on the year 1901-2); length of mains, 872,170 yards; number of consumers, 25,677; private burners, 263,191; public lamps, 15,756; gas-stoves, 20,628; gas-engines equal to 561¼-horse power.

Gas Explosion at Egremont.—An explosion of gas, attended by rather remarkable results, took place at Moor Row, Egremont, on the 5th inst. In a house in Dalziel Street, inhabited by Mr. and Mrs. Barlow, gas was fonnd to be escaping; and Mr. Fred Fawcett, the Gas Manager, was sent for to attend to the supposed defect in the pipe. He had bored a number of holes, but found no trace of a leakage in the Egremont main; and as he had no connections to any of the Dalziel Street houses, he was satisfied that everything possible had been done. He was standing outside the house at about 9.30 a.m., when an explosion of gas occurred, and he was blown to the opposite side of the street, and badly cut about the face and body by contact with the pavement. Mrs. Barlow, who had returned to the kitchen after having had some conversation with Mr. Fawcett, had a remarkable escape. She, with her three children, hurried out by the back entrance, when the ceiling and wall of the front room collapsed. The furniture was damaged, and the windows smashed; but beyond the injury to Mr. Fawcett no one was hurt.

MISCELLANEOUS NEWS.

CHARD GAS ARBITRATION.

(*Before Mr.* JAMES MANSERGH, M.Inst.C.E., *Umpire.*)

At the Surveyors' Institution on Saturday, the arbitration proceedings were continued between the Chard Gas Company and the Corporation, relative to the price to be paid for the undertaking of the Company. Mr. CORBET WOODALL was Arbitrator for the Company; and Mr. W. A. M'INTOSH VALON for the Corporation. Mr. BALFOUR BROWNE, K.C., and Mr. ERSKINE POLLOCK, K.C., appeared for the Company; Mr. HONORATUS LLOYD, K.C., for the Corporation.

Mr. *E. H. Stevenson*, further examined by Mr. POLLOCK, said that on the last occasion he had gone so far through his tables of valuation as to give the profit at £1654 8s. 5d.; and he had deducted from this £236 5s. for interest on the mortgage debt—bringing his total up to that point in the valuation to £1418 3s. 5d. He dealt with this figure by capitalizing it at 25 years' purchase, and arrived at a sum of £35,454 5s. 5d. To this he added five years' purchase of the average profit on the fittings (£64 5s. 3d.), £321 6s. 3d. Then he added 10 per cent. for compulsory purchase (£3577 11s. 2d.), which brought the figure to £39,353 2s. 10d. To this he added, for excess land and works: Land, £1122; coal-stores, £300; washers, £210; exhausters and boilers, £486; purifiers, £444; meter and governor, £361; tar and liquor tank, £191; gasholders, £2769; and sulphate plant, £317—making a total of £6200, less £50 for deficient condenser, or £6150 This figure he added to the £39,353 2s. 10d., and so arrived at £45,503 2s. 10d. as the total value of the undertaking. With regard to the items for excess land and works, with the exception of land, coal-stores, and purifiers, the price he put against the items was exactly in proportion to the cost.

Cross-examined by Mr. LLOYD: The capital of the Company would amount certainly to £750 per million cubic feet of gas sold; and then there were the excess works put on. He should say that £21,150 would represent a reasonable capital, considering the extra works. The capital employed in carrying on the business should be £750 per million cubic feet, and to this should be added £6150 for excess works.

Mr. LLOYD: I want to know what is the capital, and not what it should be?

Witness: The capital expended, so far as I can make out, now is about £1100 a million.

Mr. WOODALL: What was the total amount expended?

Witness: As far as I can make out, the figure is £23,112 8s. 6d. The capital expenditure during the last few years has been to replace certain old works, and to enlarge the new ones. So far as I can see, that has gone to capital. Witness went on to say that he did not go back into the history of the Company; he simply dealt with the accounts and the state of things that existed to-day, and was likely to exist in the future. The maximum make had been 105,000 cubic feet per day, and the output had been 107,000 feet.

Mr. LLOYD: Mr. Turner, the Manager, has given us a figure of 115,000 cubic feet.

Witness: I have stated the largest sale of recent years—in 1902.

Mr. POLLOCK: I think the figure you are taking is in 1903.

Witness said that on Dec. 17, 1903, the maximum output was 115,000 cubic feet; whilst the maximum make was, on Jan. 22, 1903, 102,000 cubic feet. They did not need to make so much in any one day, because they had sufficient holder capacity. He took as his basis maximum make, and not output, excepting in the case of the gasholders. He would not take output in regard to the manufacture. The gasholders were three in number; the capacities being 17,000, 23,000, and 100,000 cubic feet respectively—making a total of 140,000 cubic feet. The present requirements of the gasholders, he considered, was approximately 50,000 to 55,000 cubic feet; but he had allowed 65,000 feet. His reason for this was that they had never in any night lost more than 34,000 cubic feet out of their gasholders—the consumption was so even during the 24 hours. They had a very large day consumption, and the hours of lighting the town (when the press of consumption came on) only took from the storage 35,000 cubic feet; so that he had allowed nearly double this for holder room. What was generally taken was the day's make—not output; but where there was a large day consumption, allowance was made for it. He had not ascertained what proportion of the large consumers used gas for power; and he did not know whether the books showed it. The gas was consumed; and this was all he was interested in.

The UMPIRE: Is it paid for at a different price?

Witness: No; only in certain cases.

Witness proceeded to say that he did not think it made any difference, because there was no variation in the price of gas that was used for power. He did not know how far the two overlapped, excepting to the extent of the holders being more or less empty at different times. They found that during the day they got a slight gain in the holders. This district varied substantially, in that they had a larger day load than usual. In valuing the land, he did not ascertain when the Company bought it and what they had paid for it, but it was land very suitable for gas-works purposes. He did not think that a gas company would have given a better price for it than anybody else. To make use of these excess works, they would require further retorts; and they would have to put them in at the end of the existing house. He admitted that, in this case they would have to sacrifice the old coal-store; but they had made no claim for it. If he were advising the Company, he would not recommend them to sell any of the land. Having arrived at the necessary requirements for coal storage, he had put the figure at £1 per ton. He thought this was rather low; but he did not look at the accounts with regard to the coal-stores. The cost of the washers was given him by the Managing Director. The scrubber-washer and connections came to £310; and he added the value of the Livesey washer (£70 or £80), and took off 60 per cent. of the total cost as excess.

Mr. LLOYD: With regard to the exhausters and boilers, £486, there

are two rotary exhausters—one of 7000 and the other of 5000 cubic feet per hour capacity. How do you arrive at that figure?

Witness: I take the 7000 feet, which works out at 168,000 feet of gas per day; and reckoning that and the boilers, I consider there is 37½ per cent. excess.

What is the ordinary depth of purifiers?—There is no ordinary depth. They vary now from 5 to 7 feet deep; and, of course, with greater depth you do not need such a big area. The connections are 6-inch; and the capacity is 168,000 cubic feet.

How did you get at your figure for meter and governor?—By taking the capacity of the meter and the governor, and finding the percentage of excess above what was required. Then I got the cost of £722 from the General Manager; and the excess I took at 50 per cent.

In further cross-examination, witness compared the coal used, gas made, and coke sold in January to March, 1903, with January and February, 1904. Generally speaking, he was of opinion that if a lower-grade coal were used it would require more fuel; it might need a little more in the retorts.

Mr. LLOYD: As a matter of fact, last year the percentage of coal used on the works was higher than it was before?

Witness: I am not at all certain that is so. If you take it on the same basis as before, the percentage is practically the same as in the previous year.

What about the number of years' purchase? What, in your view, is the difference between a statutory and a non-statutory company?—I have asked as much as 30 years, and in one case more, for a statutory company, in special circumstances. That was four or five years ago.

Now we come to 10 per cent. for compulsory purchase. Is that your invariable rule?—It is not my invariable rule; but I leave it to the Court. I think it is only right to claim 10 per cent. when you are acting for the vendor. (Laughter.)

I think you heard me in Parliament the other day say that I would undoubtedly claim it, even if I did not get it?—Some allowance should be made for loss, and my figure of 10 per cent. simply means that it should not exceed 10 per cent. (Renewed laughter.)

Then it is a restraining influence?—Yes.

Witness went on to say that if one or two of the large consumers laid down electricity, he did not think it would make a very great difference. He did not know that at least one of them had had such a scheme under consideration. He was aware that there were one or two power-gas installations in the district; but he was decidedly of opinion that people in towns would not put in power gas where they could get coal gas. He agreed that the ordinary consumers had only increased by 37 in eleven years; but he maintained that they had increased very considerably in consumption.

Re-examined by Mr. POLLOCK, witness said that, in fixing the number of years' purchase, he had had regard to the present price of money, and what was in his mind a certainty—that the business would be very largely increased.

Mr. POLLOCK: Would Stock Exchange prices, to your mind, have any great bearing on the question?

Witness: No; I do not think they have on these matters. We cannot tell under what circumstances a certain stock is sold; and quotations are now very unreliable on almost everything.

Mr. *Alfred Edwards*, Manager of the Taunton Gas-Works, and Managing-Director of the Chard Gas-Works, said that the ordinary consumers had increased from 265 to 290 in the course of 1902-3; but these figures were misleading, because the growth in the number of prepayment customers made it difficult to arrive at the increase. In his judgment, the profits which had been made had been obtained under disadvantageous conditions.

Mr. *J. E. Tory*, auctioneer and valuer, of Yeovil, gave evidence as to his valuation of the surplus land belonging to the Company. He valued the land in accordance with the various positions of the plots, and came to the conclusion that £1189 10s. was a fair figure—making, with 10 per cent. for compulsory purchase, a total of £1308 9s.

This concluded the case for the Company.

Mr. *A. R. Morris*, land surveyor, of North Curry, gave rebutting evidence on behalf of the Corporation as to the value of the land.

Mr. *Charles Hunt* said he had made a careful valuation of the undertaking. The Company was formed in 1870, with a capital of £2000, which was immediately increased to £2500. He found that the profit for the year ended Dec. 31, 1903, was £1433 11s. 9d., less interest on debentures £236 5s.—leaving £1197 6s. 9d. From this he deducted for repairs and maintenance of works, mains, services, and meters (difference between 5·5d. per 1000 cubic feet and the amount actually expended—namely, 3·73d. = 1·77d. per 1000 cubic feet on 20,258,000 cubic feet), £149 8s. 1d., and for repair and depreciation of stoves (difference between amount actually expended, which was £38 11s. 10d., and 12 per cent. on net cost of £505 = £63 2s. 6d.) £24 10s. 8d.; thus bringing the profit down to £1023 8s. This figure he capitalized at 19 years' purchase, £19,445, and added, for three years' purchase of the average profit on the fittings business for the last four years, £193. Then he added £2031 for excess land and works, as follows: Land £495, coal-stores £226, exhausters and boilers £160, scrubber-washer £140, meter-house and meter £180, gasholder £405, tar and liquor tank £98, sulphate plant £260, and filling-up, levelling, and making roads £180; less £113 in respect of deficient condensers. Having made these additions, he found the total value of the undertaking to be £21,669, exclusive of the allowance for compulsory purchase.

By Mr. POLLOCK: He had taken the trouble to see what 19 years' purchase would mean in the percentage that would have to be earned. It would mean a little over 5 per cent.

Mr. POLLOCK: A little over 5 per cent.! It would be considerably over that; it would be over 5¼ per cent.

Mr. *Arthur Valon* also submitted a valuation, and made the worth of the undertaking to be £21,424 7s. 9d. He said he practically agreed with the valuation of Mr. Hunt.

Mr. POLLOCK: The figures are the same, with the exception of small differences.

This concluded the evidence; and a discussion between Counsel followed. The result of it was that they agreed not to address the Court, and therefore the proceedings came to an end.

SHEFFIELD UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at the Cutlers' Hall, Sheffield, on Monday of last week, under the presidency of the Chairman, Sir FREDERICK T. MAPPIN, Bart., M.P.

The GENERAL MANAGER and SECRETARY (Mr. Hanbury Thomas) read the notice convening the meeting.

The CHAIRMAN, after reading the Auditors' report, said that he thought they were met there under very satisfactory circumstances, as they all must have found after reading the accounts and report. He had no doubt they would all feel that the report was as satisfactory to the shareholders as it had been to the Directors. After paying the dividend for the half year, there was a balance of £21,019, which was carried forward and added to the balance in hand, which was £36,977—making a total of £57,996. The reserve fund was £86,848; and it was at its maximum. The position was so satisfactory that the Directors had again reduced the price of gas 2d. per 1000 cubic feet from Jan. 1 last, thus making the present price 1s. 8d., 1s. 6d., and 1s. 4d. per 1000 cubic feet, according to consumption; and all owners of gas-engines would be charged 1s. 4d. per 1000 feet if they consumed £8 6s. 8d. worth of gas during the year. If they considered the quality of the gas supplied—17·35-candle power—and the price charged, he had great confidence in stating that no private company in the world supplied gas of the same quality and at so low a price. Possibly there was one company who supplied it at a lower price than the Sheffield Company; but he would say nothing about the quality, either for or against. Their tests during the half year had been 1149, and had equalled 17·35 candles. During the twelve months there had been 2268 tests, averaging 17·37 candles. They must bear in mind that their gas was tested by the officials of the Corporation. In making the profit of £64,250, they had paid £6445 less for coals, £559 less for purifying materials, £986 less for stokers' wages, and £10,933 less for repairs of works. There had, however, been no "scamping;" and the works which required repairing or alteration had been duly attended to. The repairs of mains and services had cost £2209 less; and £252 more had been received for meter-rents, £572 more for coke, and £1772 more for tar. The latter had been at a very satisfactory price to the Company. On the other side of the account, they had received £13,321 less for gas, on account of the reduction in price which had been in force during the last nine months. For ammoniacal liquor and sulphate of ammonia, they had received £551 less, and for the fitting department £312 less. The gas sold during the last six months amounted to 1,401,515,000 cubic feet, which was 18,854,000 feet less than in the corresponding half year—a decrease of 1·32 per cent. This was no doubt largely caused by the introduction of incandescent burners, which produced several times greater light than the old flat-flame burners, and consumed much less gas. The leakage during the half year amounted to 54,315,000 cubic feet, against 52,426,000 feet in the corresponding half year—equalling 3·73 per cent. They had made 10,322 cubic feet per ton of coal, against 10,365 feet in the same period of last year, and had fixed the extraordinary number of 3423 additional meters, after deducting those they had removed (mostly 3 and 5 light), during the year. This, he considered, was a very satisfactory feature of the undertaking. The Company had 4600 consumers under contract for maintenance, and they kept their mantles and burners in good condition, charging 3d. per burner per month. There were 25 men employed on this work, and 18 men engaged attending to gas-stoves and gas-fires. No charge was made for the work the latter men performed. He had previously referred to railway companies lighting their stations with electricity at a great cost; and he noticed the Great Eastern, in spite of this cost, had adopted this mode of lighting at the Newmarket Station. But yet their account for gas at the station was no less than it was before they had the electric light, so that they had to pay for the latter in addition. The London and Brighton Railway Company had acted, in his opinion, with better judgment; for they had lighted their Victoria Station by incandescent gas, and discarded their former mode of lighting by electricity. The Gaslight and Coke Company had supplied it, and effected a saving of £900 per annum by lighting that one station with gas instead of electricity, though the Railway Company supplied their own current previously. No railway company, in his opinion, could afford to ignore such economy, with falling traffic and increased expenses; and they must not be surprised if shareholders at half-yearly meetings called attention to this waste of money—he could not describe it in any other way. The inspectors at Victoria Station said that it had never been so well lighted before, that there was a better distribution of illumination, and that it was more generally useful, especially in foggy weather. All this was obtained at a cost of many hundred pounds less than lighting by electricity. He was not stating what had been done by the London and Brighton Railway Company for any advantage to the Sheffield Gas Company, because they already suppled with gas all the sixteen stations of the Midland Railway Company in the locality. As he had said before, the Railway Company supplied half the Wicker Station with electric light at a cost of £3855 for twelve months; and the Gas Company furnished all the rest of the sixteen stations with gas for £3176. Leeds, he saw, was taking a very curious step in lighting the streets with electricity, and were charging for it 1¼d. per unit, though it was admitted by all that the cost of the current was not less than 3d. per unit; and even at 1¼d. per unit, electricity was 25 per cent. dearer than incandescent gas. Cheltenham had the very great deficit for electric light of £17,162, which, for a place like that, was very serious. They charged their private consumers 5¾d. per unit; and with all this, they made the loss he had referred to, and in eight years had expended £147,000. Churches in Sheffield were also using the incandescent light, and replacing their old flat-flame burners; and in Bristol they were bringing it into the streets, and supplanting electric lights. They had there tried 135 burners by incandescent gas, and reduced the consumption from 1348 to 675 cubic feet per hour—a saving of £238 per year. He thought incandescent gas installations were becoming pretty common throughout the country; and where introduced they were a great improvement on what had previously been used, whether electricity or ordinary gas-burners. At both the Cutlers' Hall and Mappin Art Gallery they had high-pressure gas; and

for pictures it was a very great advantage. In Birmingham, the Tramways Department had adopted the same system for lighting the carsheds. The Smethwick Town Hall was similarly illuminated. Messrs. Tangye Bros. had fitted their erecting shops with high-pressure lamps equal to 105,000-candle power, and were placing the system in their large foundry and pattern-making shops; and when complete, they would have five installations of high-pressure gas-lamps equal to 204,000-candle power. The naphthalene complaints had not ceased, though they had persevered with the plan that they thought would cure it. It had done so to a great extent; but they were not quite so successful last year as the year before. They were, however, next month going to try in Sheffield another process which one of their correspondents in a large gas company informed them had been attended with a wonderful reduction. The "JOURNAL OF GAS LIGHTING" complained that so little was known relative to the fire-resisting preparations of fire-clay goods used in such large quantities by gas companies.* They said that the duration of the retorts in service was ruled "by practice," instead of by "scientific knowledge." No scientific estimate as to exact measurement or quality or durability was published. For fire-brick built-up retorts, German fire-clay goods, they found, had been offered in large quantities for some years past. They were not "dumped" down, and were not low-priced. They were well made; and their silica bricks, when placed in furnaces with English bricks, at once demonstrated how accurately they were made, and how well and close the joints were when built up. This was a result of his (Sir Frederick's) observations; and the Sheffield University College Technical Department had just erected a Siemens-Martin gas-furnace for melting steel. He believed this was the fourth in England that had been erected; while they had about seventy of them on the Continent. This was not going ahead as Englishmen liked to do, and showed they were lagging behind in that respect. The silica fire-bricks were used in the construction of these furnaces, both English and German. Both had been analyzed; and it was found that the English were of better material, but the German bricks were better made and had better joints. Anyone who saw them in the furnace before it had been touched, and before it had been used, would say at once, as he did, there was no doubt which were the best and truest made. The German bricks required less cement in setting, and therefore lasted longer; and the joints were much smaller. Their experience with these furnaces, though only a few days' running with very high heat, had shown them at the Technical Department that they were better made in Germany than they were here. German bricks had the ganister ground and sifted finer than the English; and great pressure was used in their manufacture. He hoped that something would be done in the Technical Department in Sheffield in calling attention to this subject. He believed they had only one student out of 1300 or 1400 connected with the making of silica bricks; and he was very much interested in it. He trusted that the information and experience he might gain would induce his employers to change their mode of manufacture and produce bricks equal to the Germans.

Mr. E. HALL seconded the adoption of the report and the balance-sheet, and the motion was carried.

The CHAIRMAN next moved, and Mr. H. K. STEPHENSON seconded, that a dividend be declared for the half year of 5 per cent. on class "A," "B," and "C" stocks; and this was agreed to.

Mr. ROPER called attention to complaints by shopkeepers as to the naphthalene, and suggested that they should receive more prompt attention.

The CHAIRMAN replied that he never heard they gave inattention to shopkeepers' complaints, and added that they were more quickly attended to than others which were received.

Mr. J. D. WEBSTER moved that the Directors' remuneration be increased from £1500 a year to £2000—the maximum sum permissible—and that the amount be divided among them in such a way as they should determine.

Mr. A. W. CHADBURN seconded, and the proposition was carried.

On the motion of Mr. S. SMITH, seconded by Mr. J. BROADHEAD, a vote of thanks was accorded Sir Frederick Mappin for his services as Chairman; and in reply the CHAIRMAN said that he desired the officials to be included in the motion.

HARROW AND STANMORE GAS COMPANY.

The Half-Yearly Meeting of this Company was held yesterday week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. CHARLES HORSLEY, J.P., in the chair.

The ENGINEER and SECRETARY (Mr. J. L. Chapman) having read the notice convening the meeting, the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the balance-sheet appeared to him to be a very good one—in fact, it was one of the best they had had in the history of the Company. As the report stated, the business continued to progress; and they had a balance on profit and loss account of £5441. They were doing excellently at Harrow, and were increasing at a fast rate; and their Engineer could tell them that there was prospect of further increase. There was no doubt the concern had turned the corner very well. Some years ago, the business was standing almost still; but now they were going ahead in a very satisfactory way. Comparing the principal items in the accounts with those for the corresponding half of 1902, he stated that the total receipts amounted to £13,153, which was an increase of £1513. The gas-rental had reached the sum of £10,670, which was an advance of £1077, notwithstanding that the price of gas was reduced by 2d. per 1000 cubic feet on the 1st of October last. The quantity of gas sold was extremely gratifying. It was 50,975,000 cubic feet, which was an increase of 6,662,000 cubic feet, or equal to 15 per cent. There was a little augmentation in the income from meter fittings and stove rentals. The receipts from coke amounted to £1309—an increase of £355, which was very good, and was due to the extra coke they had had for sale by reason of the use of regenerative furnaces. There was a slight decrease in the tar receipts; but a small addition to those for sulphate of ammonia. In regard to the expenditure, the total was £8939, which was an increase of £729. Looking at the items constituting this expenditure, it was found that coal had cost £320 more; but they had carbonized an extra 467 tons. The price of oil, too, had gone up ½d. per gallon, and was responsible for an increase of £100. The item of rates and taxes was £894, which was an advance of £378, and was due to increased assessment, which no one could help. There were also other small variations which need not be gone into. But the result was that the profit for the half year had reached £4213, which was an increase of £784 compared with the corresponding period of the previous year. Of the profit, the dividend and mortgage interest would require £3897; and the Government tax for the whole of the new capital had been paid for out of revenue, absorbing £232 10s. He thought that to take this at once out of revenue was the best thing for them to do. However, these two items amounted to £4129; and it left £83 out of the profits to be carried to the previous amount of undivided profit, £1978—making a balance of £2062 in hand. The total quantity of gas made in the half year was 56,318,000 cubic feet. The coal used amounted to 3827 tons; and the gas made from this was 40,706,000 cubic feet. This was equal to 10,636 cubic feet per ton of coal carbonized, which was very good indeed. The oil used was 45,578 gallons; and the carburetted water gas made was 15,612,000 cubic feet, so that the oil used averaged 2·90 gallons per 1000 cubic feet. The gas sold amounted to 50,975,000 cubic feet; on the works, 760,000 cubic feet were consumed; and the quantity unaccounted for was 4,583,000 cubic feet, which represented 8·56 per cent. But, taking the whole year, the quantity unaccounted for was equal to 6·72 per cent. The capital now stood at £1 per ton of coal carbonized less than it did at the commencement of 1903. These few points he thought bore out his opening statement that the balance-sheet was one of the best the Directors had ever had to present to the shareholders.

Mr. A. F. PHILLIPS seconded the motion, which was unanimously carried.

A resolution was next passed, declaring dividends at the rate of 9¼ per cent. per annum on the original "A" capital, of 7 per cent. on the additional "B" capital, and of £6 9s. 6d. per cent. on the additional "C" capital and guaranteed shares, all less income-tax.

On the motion of the CHAIRMAN, seconded by Mr. A. W. OKE, Mr. A. H. Baynes was re-elected to his seat at the Board.

Mr. Horace J. Rydon having resigned his position as Auditor, it had been announced that Mr. W. G. Chapman would offer himself for the position; but since he submitted his name as candidate, he had received an appointment under the Crown which precluded him taking up a position outside which carried with it any remuneration.

Mr. T. H. MARTIN proposed, and Mr. SAMUEL CUTLER seconded, the appointment of Dr. Goddard; and this was agreed to.

A vote of thanks having been passed to the Engineer and Secretary,

Mr. CHAPMAN, in responding, said it was a great pleasure to him to have lived long enough to see the Company become a real strong concern. In the old times, they had gone through many days when anxiety was continually present as to the results that would be obtained, and as to the position they would be in in the future. But it seemed now that the darkness had completely passed; and they were progressing as rapidly as they could desire. The balance-sheet indicated the improved position of the Company; and he thought the next meeting would show it on a stronger base still.

Mr. OKE, in moving a vote of thanks to the Chairman and Directors, referred to the small item of 17s. 6d. for transfer fees, remarking that this indicated how difficult it must be to now obtain shares in the Company.

Mr. ROBERT RANDALL seconded the motion, which was heartily agreed to.

The CHAIRMAN'S acknowledgments concluded the proceedings.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

Honouring the Chairman at Blyth.

At the recent annual meeting of the Blyth and Cowpen Gas Company, there was an interesting event in the shape of the appointment of a Committee to consider a fitting way in which to acknowledge the highly valuable services rendered to the Company for over forty years by the Chairman (Mr. William Thompson), and to commemorate his eightieth birthday in July next. The business portion of the meeting was also of a satisfactory character. The Directors' report stated that the coal carbonized during the year was 8040 tons, yielding 87,198,600 cubic feet of gas. The demand for gas for all purposes continued steadily to increase. The number of prepayment meters in use at the end of the year was 2550, compared with 1950 at the close of the previous year; while the ordinary meters and public lamps had also increased. The receipts for gas sold showed an increase of £2633; and there was a balance of £3461 as the net profit for the year. The amount standing to the credit of profit and loss was £5427, out of which the Directors recommended the payment of a dividend at the rate of 5 per cent. on the original capital, and 3½ per cent. on the additional capital "A" shares. The interim dividend being of the same amount, makes the dividends for the year 10 and 7 per cent. After the report had been adopted, an extraordinary meeting was held, at which it was resolved to authorize the Directors to borrow £10,000 on mortgage.

A Good Half Year at Dover.

One of the last Gas Companies to hold their half-yearly meeting is the Dover; and it is satisfactory to find, from the statement of the Chairman (Mr. Willsher Mannering) to the proprietors on Monday of last week, that the sale of gas during the six months ending Dec. 31

* See *ante*, pp. 463, 530, 614.

last showed considerable augmentation. The total quantity sold was 124,123,200 cubic feet, compared with 119,560,800 cubic feet in the corresponding period of 1902; being an increase of 4,561,000 cubic feet, or at the rate of 3·8 per cent. This was partly due to the extending use of prepayment meters, which at the end of last year numbered 3106, against 2777 before, or 329 more than at the close of the year 1902. The quantity of gas registered by these meters was 25,225,000 cubic feet, or 20 per cent. of the total consumption. There was also an increase in the supply to the ordinary consumers, the public lamps, and the War Department. The total revenue was £25,855, and the expenditure £21,064; so that there was £4791 carried to the profit and loss account. The net profit, after paying interest on loans and the income-tax, was £3747, which was sufficient to pay the full dividend of 7½ per cent., and leave a balance of £348 to be added to the £1212 brought forward. Mr. Mannering concluded by congratulating the shareholders upon the satisfactory results of the half-year's working and the excellent position of the Company; and Mr. Hayward, in proposing a cordial vote of thanks to the Directors and the staff, acknowledged to what extent this position was due to their services on behalf of the undertaking.

Liberal Treatment of Consumers at Enfield.

Considering the liberality with which the Enfield Gas Company treat the consumers, we are not surprised at the flourishing condition of the undertaking as revealed by the proceedings at the recent half-yearly meeting, at which Col. Sir A. P. Somerset, K.C.B., presided. In the first place, the Directors presented a report in which they stated that the sale of gas in the six months ending the 31st of December exceeded that of the corresponding period of 1902 by 5,819,000 cubic feet, or 9·42 per cent. The revenue was £12,669, compared with £11,699; and the total receipts amounted to £17,250, against £15,607. The balance carried to the profit and loss account was £3907, compared with £3217. The profit, after providing for interest charges, amounted to £3442; and the Directors recommended the payment of dividends for the half year at the rates of 5 and 5½ per cent. per annum on the consolidated preference and ordinary stocks, both less income-tax. This would absorb £3171, and leave £271 to be added to the undivided profits, bringing up to £2426 the amount to be carried forward. In moving the adoption of the report, the Chairman referred to the continued growth of the Company; the gas sold for the past year being 128 million cubic feet. He put it to the proprietors that the Local Authority, in making requests for the erection of additional public lamps 100 yards apart, gave direct testimony to the very effective illumination of the public streets by the incandescent system of lighting controlled by the Company. Mr. A. L. Ford, who seconded the motion, pointed out that upwards of 10,000 cubic feet of gas had been sold per ton of coal carbonized, that the fuel account had fallen to 20 per cent. of the coke made, and that, when compared with the corresponding half year of 1902, 270 tons less coal had been used. He said the gas-rental had increased by £970, notwithstanding that, for the first quarter, the price was 3d. per 1000 cubic feet less; the residuals had produced more by £470; and while the capital had been safeguarded to the fullest extent, the net revenue justified the recommendation of a 5½ per cent. dividend on the ordinary stock. He added that up to the present time the consumers solely had enjoyed the advantages of the sliding-scale arrangement, as the price of gas had been from time to time reduced till now it was 9d. per 1000 cubic feet below the standard, without any addition being made to the dividend; so that they had been very liberally dealt with. The report was adopted. In returning thanks for his re-election as a Director, Mr. J. W. Ford referred in highly appreciative terms to the services rendered to the Company by the Secretary and General Manager, Mr. C. W. Offord.

A Jubilee Year at Hastings.

The half-yearly meeting of the Hastings and St. Leonards Gas Company on the 3rd inst. occurred on the Jubilee of the Company's incorporation; and, in moving the adoption of the 100th report, the Chairman (Dr. Gray, J.P.) remarked that many of the shareholders present could look back over a large portion of the fifty years, and congratulate themselves on the success of the undertaking. During the last ten years there had been an increase of more than 114 million cubic feet in the quantity of gas sold, and 4200 in the number of consumers. Last year the increase had been 529; and it was gratifying to find that the 100th half year bore comparison with any of its predecessors, and, indeed, showed the largest profit ever made. The new works at Glyne Gap [a full description of which was given in the "JOURNAL" last summer] had been progressing satisfactorily. The plans were all working out well; and the only matter for complaint was the bad weather. Comparing the accounts for the past six months with those for the corresponding half of 1902, there was an increase of a little over 4½ million cubic feet in the quantity of gas sold, or £802 more in the amount received. There were several other increases, including £166 on the letting of stoves, &c., and £662 on the sale of residuals. There had been a small decrease of £164 on miscellaneous matters, bringing the net additional receipts to £1466, which, with a saving of £600 on the expenditure, made an increase of £2066 carried to the profit and loss account, out of a profit of £13,449—a considerable augmentation of an already satisfactory balance. In the course of his remarks, Dr. Gray referred to the substitution of incandescent gas for electric lighting at Victoria Station, and the saving of £900 a year by the change (see *ante*, p. 465); and he mentioned that a little more than this amount was the deficiency last year on the electricity works of the Hastings Corporation, which the ratepayers would have to meet. Some time ago, the Company offered to light by electricity the whole of the public lamps lighted in this way by the Corporation, generating the current by means of gas, at a saving of more than £1000 a year. The offer was declined; but the Chairman said they could repeat it with an even greater saving, owing to improved machinery. Alderman Bray, in seconding the motion, remarked that the loss to the ratepayers on the electric light undertaking, on the Chairman's figures, was equal to a rate of 1⅛d. Mr. Davis, referring to the fact of this being the Jubilee year of the incorporation of the Company, quoted some interesting particulars from a report made after a public inquiry on behalf of the General Board of Health in 1850, four years previous to the incorporation of the Company. At that time, the gas consumers had, he said, a grievance, inasmuch as the charge for gas was 8s. per 1000 cubic feet; and they brought the matter forward at the inquiry. The total capacity of the three gasholders was 86,600 cubic feet; the size of the leading main to the town was only 8 inches, and that of the leading main to St. Leonards 4 inches. There were 242 public lights in the whole of the borough; and the quantity of coal carbonized annually averaged 1300 tons. The total capital sum expended on the works did not then exceed £20,000. From these small beginnings had the Company prosperously extended with the growth of the town. The report, in which dividends of £6 10s. and £5 per cent. per annum on the 5 and 3½ per cent. converted stock, and £6 1s. per cent. per annum on the additional stock, were recommended, was adopted by the meeting.

Gas and Electricity at Lewes.

Referring at the meeting of the Lewes Gas Company to the appearance of electricity in the town, the Chairman (Mr. M. S. Blaker) remarked that they had not found that the presence of the rival illuminant had had any effect in reducing the consumption of gas. On the contrary, the output for the past half year had been considerably greater than in the corresponding period of 1902. No doubt the presence of electricity tended to exalt altogether the standard of light in the town. People required a higher power of illumination—at least, they fancied they did—and this no doubt was the cause why the presence of another light did not operate unfavourably on the output of gas. He thought there was a great deal in the standard of illumination being raised, because he was old enough to recollect the day when, as the shades of evening drew near, the bell used to be rung and the servant brought up a couple of dip candles with a pair of snuffers on a tray. He asked anyone present if he thought he could see to write out the accounts presented to them that day, or do his ordinary work, in a room lighted with two dip candles, though assisted by a pair of snuffers when the wick grew very long? This was not more than fifty years ago; and the eyes of the present generation having become accustomed to a higher standard of light, they could certainly not go back to such illumination as existed in those days. The same process of improvement kept going on; and if gas stimulated electricity, electricity in turn stimulated gas. So the two illuminants, apparently rivals, did not do the injury they might be expected to do to each other, owing to the general enhancement of the standard of illumination which they both tended to produce. In reply to a question, the Chairman said the matter of the reduction of the price of gas was one that not only had been present to the minds of the Directors of late, but he might say it was always more or less before them. If they could see their way to make any reduction, they would be happy to do so; but there were two ways of viewing the question. One way would be to lower the price, and another plan would be to give the people a little more illumination for the same amount of money. The report presented was a favourable one—the full statutory dividend having been earned, under the energetic management of Mr. Levi Monk.

The Stretford Gas Company Feel the Increased Rating.

Notwithstanding the gradual increase in the burden of rates at Stretford, the position of the Gas Company, according to the statement of the Chairman (Mr. W. L. Galloway) at the half-yearly meeting on Monday last week, is stronger than ever; the past year having been the most prosperous one the Company have had. The profits in the first half amounted to £7790, and in the second to £7129. Dividends at the rates of 10, 7½, 7, and 5 per cent. per annum were declared for the former period, and others at similar rates were recommended for the latter. From the disposable amount at the end of June, £2000 was added to the reserve fund, £500 to the insurance fund, and £846 was carried forward; and the Directors now recommended that the reserve should be further increased by £1250 and the insurance fund by £600—leaving £1215 to be carried forward. The Chairman, after alluding to the various items in the accounts, said the total expenditure had been less, and the receipts more, than in the previous year, especially for residuals, while the revenue from the sale of gas, notwithstanding the reduction of 3d. per 1000 cubic feet, showed a satisfactory increase. The growing burden of rates and taxes was next dealt with. The Chairman stated that the amount at which the Company were assessed had increased since 1897 from £5592 to £7979, and even now the works were being surveyed with a view to further raising the assessment. The payments under this head represented more than 2d. per 1000 cubic feet of gas sold, against 1¼d. in 1897. This and the growing competition from electric lighting schemes, made it necessary for the Board and their officers to exercise the utmost vigilance in keeping down the capital charges and working expenses to the very lowest point. The work of reconstruction was, however, expensive. The Board were proceeding with the modernizing of the plant as rapidly as possible; but they did not expect to complete it for several years yet. The report was unanimously adopted, and the dividends recommended were declared.

Improved Plant Helps Progress at Tonbridge.

Notwithstanding adverse circumstances—the competition of a rival illuminant, the loss of a very large consumer by the removal of his works, and a reduction of 3d. per 1000 cubic feet in the price of gas used for power purposes—the Chairman of the Tonbridge Gas Company (Mr. J. Fagg) was able to announce to the shareholders, at the recent annual meeting, that the accounts for the past year were the most favourable the Directors had ever been able to present. The new machinery for unloading and storing coal [of which an illustrated description has been given in the "JOURNAL"] effected a saving of £130 last year; and the sulphate plant which has been erected has already resulted in a great increase in the amount received for residuals. It is expected to pay for itself in a year-and-a-half. Under these circumstances, the Directors are considering the advisability of adopting other improvements which will give a good return on the outlay. In the course of his remarks, Mr. Fagg cited some interesting figures to

show the great progress of the Company during the past eight years. The quantity of gas made in 1895 was 39 million cubic feet; last year it was nearly 82 millions. The capital had increased from £32,300 to £53,600; but the capital expenditure per million cubic feet of gas made had been reduced from £830 to £637, which meant that it required £9 less per annum for interest on capital for every million feet of gas produced. The price had been brought down from 3s. 6d. to 3s. and 2s. 9d. per 1000 cubic feet; and the 6d. reduction meant a saving of £2000 per annum to the consumers. The dividends in 1895 were 10, 7, and 5 per cent.; they were now 11½, 8½, and 5 per cent. The gas unaccounted for eight years ago was 10 per cent; now it was 5 per cent., representing a saving of £600 per annum to the Company. The balance available allowed of the payment of dividends at the last-named rates, with £4105 to the good. The Directors and the Secretary and Manager (Mr. J. Donaldson) were cordially thanked for the way in which the Company's business had been conducted during the past year.

Good Prospect for Tynemouth Gas Consumers.

According to the report presented to the shareholders of the Tynemouth Gas Company at the annual meeting on Monday last week, the charge for gas is about to be reduced 1d. per 1000 cubic feet, and if the Company's Bill now before Parliament is passed, an additional 1d. will be taken off before the end of the year; bringing the price down to 2s. 1d., less the usual discounts, varying from 5 to 20 per cent., and reaching the lowest figure at which gas has ever been sold in the borough. With regard to the working last year, owing to the price of gas having been reduced 2d. per 1000 cubic feet in the early part of it, the revenue of £41,384 from the sale of gas was only slightly in excess of that of 1902. For residuals, however, £3179 more was received. There was last year an increased make of 14,197,700 cubic feet of gas, or 3·66 per cent.; while the number of consumers on the books on Dec. 31 was 13,566, compared with 12,008 at the close of 1902—an addition of 1558, or 12·79 per cent. The total revenue was £60,932, and the expenditure £45,329; leaving a balance of £15,603. This, added to the balance brought forward, made £20,007; and it was dealt with as follows: Payment of an interim dividend at the rate of 5 per cent. per annum, £4108; final dividend at a like rate, £4426; carried to the reserve fund (raising it to its maximum of £10,750) £1750; added to plant renewal fund, £2000. These amounts together came to £12,284, and left a balance of £7723 to be carried forward. A highly satisfactory report was received from the Company's Engineer (Mr. W. Hardie) as to the condition of the works and plant at the present time.

Water.

Increased Revenue Accompanies a Wet Season at Bristol.

At the annual meeting of the Bristol Water Company on the 5th inst., the Directors reported that the revenue from water-rates in the past year was £139,663; being an increase of £3662 on that for 1902. In that year, there was an exceptional receipt of £1400; and this was not only maintained, but further increased by £3662. The Company spent £106,982 on capital account during the year, £62,159 of which was for works, and £26,348 for new offices and works department. The amount available for distribution on the year's operations (inclusive of £4618 brought forward) was £62,951. Out of this, the Directors paid on the 10th of September an intermediate dividend at the rate of £7 10s. per cent. per annum on the ordinary shares, and £5 5s. per cent. per annum on the 7 per cent. maximum consolidated ordinary stock—leaving a balance of £35,549 7s. 8d. applicable for dividend on the ordinary capital. They recommended the payment of final dividends at the respective rates of 8 per cent. per annum on the ordinary shares and £5 12s. per cent. per annum on the ordinary stock; leaving a balance of £6040 11s. 8d. to be carried forward. The Chairman (Mr. E. Bush), in moving the adoption of the report, laid stress upon the fact that the advance which was looked upon as exceptional in 1902 had been overtopped to the extent of £3662; and he added that the increase must be regarded as remarkable, considering the quantity of rain which had fallen, and had filled the wells and cisterns everywhere. There was a balance of £35,549; and after the payment of the dividends recommended, there would remain £6040 to be carried forward. The report was adopted.

More "Push" Required at Woking.

The half-yearly general meeting of the Woking Water Company on Monday last week was the occasion of a little criticism of the Directors' methods. The Chairman (Mr. Charles Horsley, J.P.) had to move the adoption of a report which was not quite so favourably regarded on the shareholders' side of the table as on that of the Board; and though it was adopted, it was not until there had been some plain speaking. The revenue from the supply of water in the six months ending Dec. 31 was £6251, which was only about £400 more than in the corresponding period of 1902; and it was complained that this was a falling off as compared with the preceding year. It was suggested that, instead of increasing by only £1000 a year, as was the case, it should be twice this sum, considering the large amount of capital sunk in the concern as compared with a neighbouring Company, whose revenue had gone up £1500 a year with half the capital. An opinion was expressed that there was a want of energy in the development of the Company's business. It was pointed out that a water company was a trading concern, and that active canvassing was necessary. The Company had practically an unlimited supply of water, and therefore it was the duty of the Directors to push their business more than they had done in the past. The Chairman said the Board would carefully consider the suggestions which had been thrown out; and if the concern required a little more push, they would endeavour to give it. They had had a very uphill fight, and he asked the shareholders to wait patiently for another six months to see how they were getting on. The report showed a sum of £3216 available for distribution; and a dividend at the rate of 4 per cent. per annum, less income-tax, was declared, which absorbed £3163.

A CO-PARTNERSHIP PRESENTATION AT SYDENHAM.

A Lucky Secretary—Workmen Accident Juries.

A large and happy gathering of the Crystal Palace District Gas Company's men took place on the works last Friday afternoon, when the Chairman, Sir George Livesey, on their behalf, made a presentation to Mr. F. J. Jones, the Secretary of the Co-Partnership System. The gift consisted of a handsome gold watch and chain; the former bearing the following inscription: "Presented to Mr. Frederick J. Jones by the employees of the Crystal Palace District Gas Company, in recognition of his efforts to promote the success of the Co-Partnership System. March 11, 1904."

Before making the presentation, Sir George Livesey called for speeches from several men representing the different departments. Mr. Waller, who was the first speaker, said that Mr. Jones had acted as Co-Partnership Secretary for ten years; and he had always received the men in a kind and courteous manner, which they appreciated very much. They were also grateful to him for his untiring efforts to make the scheme successful. It was felt by many of the men that this was an opportunity for them to show their esteem, and at the same time ask Mr. Jones to accept a birthday present; and he was sure he would be voicing the feelings of all when he wished him "Many happy returns of the day." Might he be spared long to serve the cause which he had so much at heart. Mr. Kay remarked that one thing in particular had done much to promote the good feeling which existed between Mr. Jones and the men, and that was the entire absence of "officialism" in his manner towards them. He was always willing to give advice, and was keenly interested in their welfare; and he (the speaker) had the hearty support of his fellow-workers in the retort-house, when he said that in Mr. Jones they had a firm friend. Mr. Mason expressed his pleasure at the fact that so united a body of workers had met that afternoon for the purpose of the presentation; and he trusted that Mr. Jones might be spared for many years to serve the Company and for the good of the employees. Mr. Bather said there was one thing he should like to add—namely, that not only the men at present on the works, but also those who had left the Company, entertained a good feeling towards Mr. Jones. No one who went to the co-partnership office ever met with a rebuff there. Inquirers might possibly be sometimes a little disappointed; but at the same time they always left in a good temper.

In making the presentation, Sir George Livesey remarked that an occasion of this sort was one of the pleasantest a man could enjoy in the course of his life; and it was a matter of very great gratification to him and all the Directors to find an officer of the Company spoken of in the terms that had been applied to Mr. Jones. The staff and the Board were greatly indebted to Mr. Jones for the manner in which he had worked the scheme; for without this work, it would not have been the success that it was. Had Mr. Jones behaved in a different way, he would not have received this present, and large numbers of the men would not have occupied the position they now did as owners of property. One very pleasing point about the scheme was that it promoted true brotherhood among them all. Unfortunately, the Directors were unable to make the personal acquaintance of all the men (which was one great disadvantage of the large commercial and manufacturing undertakings of the present day); but he thought he might claim that they desired their welfare. He offered the hearty good wishes of the Board to Mr. Jones, and hoped he might remain long in the service of the Company.

A very feeling acknowledgment of the gift and the kind remarks of the different speakers was made by Mr. Jones. He stated that he entered the Company's service 24 years ago as a messenger; and little did he then think that one day he would be in the proud position he that afternoon occupied. He hoped that the good feeling which existed between the men and himself would never alter.

In the course of a few remarks, Sir Fortescue Flannery pointed out that the last time he had an opportunity of saying a few words to the same audience was on the occasion when, in the same spirit as had actuated them that day, they made a presentation of a very handsome and gratifying character to their Chairman. They then did for Sir George Livesey what they had now done for Mr. Jones—recognizing that both of them had been working in the direction of co-operation between all those engaged in industrial enterprises, and setting a lead not merely in the gas industry, but (as he sincerely hoped) throughout the whole of the industry of this country. Let the principle of co-partnership go on and prosper, and then they would have no more disputes as to the sharing of the profits of industry, because all would share them in a proportion which would settle itself by natural laws and in the easiest and most proper manner. They in Sydenham under the guidance of their Chairman, were doing a great pioneer work, which he believed would extend, with highly beneficial results to all concerned. Last year, the Company were disappointed in regard to obtaining legislation which would have enabled two of the workmen to join the Board of Directors; but they were trying again this year, and he trusted they would this time be successful. Another thing he might mention to them was a subject of great interest which had just been discussed by the Board—namely, the question of appointing juries of workmen to inquire into accidents on the works. Their Chairman had initiated in the South Metropolitan works a very excellent system by which every accident was investigated by a jury of workmen in the employ of the Company; and they were able to say who (if anyone) was to blame, and how such an occurrence might be prevented in future. If this plan was extended to Sydenham, the Directors knew the men would carry it out in a spirit of honest inquiry, for the purpose of making their work safer and safer as time went on. He concluded by moving a hearty vote of thanks to their Chairman for the additional proof of his never-ceasing interest in the welfare of his fellow-workers afforded by his presiding over that meeting and making the presentation.

The resolution having been seconded by Mr. Jabez Light, was carried amid applause; and Sir George Livesey thanked those present for their vote, and for the way in which they had all worked so as to make the

co-partnership system a success. He said the South Metropolitan Company had started the plan five years earlier; but things were even better at Sydenham than they were there. The jury system which had been referred to was introduced eleven years ago at the South Metropolitan works; and it had answered so well that it had become a standing rule with the Company. At first it was applied only to serious accidents; but afterwards it was extended to small ones also, with the greatest benefit to everyone concerned. Therefore he had suggested to Mr. Shoubridge that similar inquiries should take place into all accidents at the Crystal Palace works.

The proceedings were brought to a close with hearty cheers for Sir George Livesey and Mr. Shoubridge.

THE LIGHTING OF GLASGOW.

Incandescent Gas Lighting Recommended.

The subject of the lighting of Glasgow streets has for some time been engaging the attention of the Watching and Lighting Committee of the Corporation. In order to ascertain what was being done in other towns, the Committee, in December last, appointed a deputation to go upon a visit of inspection. Visits were made to Leeds, Bradford, Sheffield, Liverpool, London, and Brighton; and a report was drawn up and laid before the Committee on Friday last.

In this document, the deputation state that the points which impressed them were: (*a*) The almost entire unanimity of opinion in regard to the advantage to be gained by the adoption of the incandescent system of gas lighting for street illumination. (*b*) The necessity for the adoption of a type of lantern specially suited to this system. (*c*) The need for supplying the burners with sufficient gas to obtain the best results. In every place visited the amount of gas used per burner was considerably greater than was at present used in Glasgow. (*d*) The great benefit derived from utilizing a staff of men for the maintenance of burners and mantles, and also for inspection purposes. (*e*) The system of adapting the illuminating power to the requirements of different classes of streets, and also of increasing such illuminating power at street crossings. (*f*) That in no city visited was the electric arc lighting superior to that in Glasgow. (*g*) The unsuitability of electric incandescent light for street illumination. (*h*) The generally low standard of street lighting in Glasgow compared with what was seen in other cities, with the exception of the streets lighted by electricity.

The deputation made the following recommendations: (1) The total abolition of all flat-flame burners. (2) The adoption of an approved system of incandescent gas lighting for all streets in which gas is used. (3) The abolition of the present form of globular lantern. (4) The adoption of a suitable pattern of square lantern, so that full value may be obtained from the incandescent burners, and the cost of upkeep for mantles, &c., kept as low as possible. (5) The lighting of all car routes (not lighted by electricity) by two-burner lanterns; the burners used to be No. 4 Kern or other suitable burner, consuming $3\frac{3}{4}$ cubic feet per hour. (6) The lighting of all main streets, other than car routes, by single-burner lanterns, with No. 4 Kern or other suitable burners, consuming $3\frac{3}{4}$ cubic feet per hour, with double-burner lanterns at all important crossings. (7) The lighting of all other streets by single-burner lanterns, with No. 3 Kern or other suitable burners, each consuming 2·8 cubic feet per hour, with double-burner lanterns to be erected at crossings where necessary. (8) The use of anti-vibrators in all lanterns erected in those streets where heavy traffic prevails. (9) That a staff be organized for attending to the maintenance of burners and mantles, and also for inspection purposes. (10) That at street crossings transparencies indicating the names of the streets at the corners of which the lamps are situated be inserted in the lanterns.

Mr. James D. Borthwick, the Police Treasurer, estimates that the initial cost of the installation recommended would be £21,644, which, spread over eight years, would involve an annual charge of £2706. At $3\frac{1}{2}$ per cent. the interest charge on this might be taken as amounting, for the first year, to £760, falling by (say) £95 per annum as one-eighth of the total amount was written off yearly. As regards the gas supply, with double-burner gas-lamps on all car routes, consuming $3\frac{3}{4}$ cubic feet of gas per hour per burner, the annual consumption of gas at 2s. 1d. per 1000 cubic feet would amount to £23,345; while under another scheme, which provides for each burner in the double-burner lamps on car routes consuming only 2·8 cubic feet per hour, the annual cost of gas would be £21,796. As compared with the present consumption of gas for public lighting, which costs £15,254, the additional cost of the former scheme would be £8091, and of the latter £6542. Mr. Lewis estimates that the adoption of the recommendations will necessitate the addition, for lighting, cleaning, and extinguishing purposes, of five men; and for cleaning and replacing burners, mantles, and chimneys, an outside staff of eight men (including two inspectors), and an inside staff of one lad and three boys. The addition to the wages bill he calculates at £1020 per annum. For replacements of mantles and chimneys (6 mantles and $1\frac{1}{2}$ chimneys per annum per burner), for 8200 additional burners—bringing up the total from 9800 to 18,000—the estimate is £480 per annum. Thus the whole immediate charge on the rates would be, under the first scheme of consumption, £13,057, and under the second £11,508 a year.

There are at present 799 electric arc lamps and 14,753 gas-lamps utilized for the lighting of public streets. Of the former, 749 are 12-ampère lamps, and 50 of $7\frac{1}{2}$ ampères. Of the gas-lamps, 8556 are fitted with single incandescent burners, consuming $2\frac{1}{2}$ cubic feet per hour; 595 with double incandescent burners, each consuming $2\frac{1}{2}$ cubic feet per hour; and the remainder (5602) have flat-flame burners, mainly consuming 2 cubic feet per hour. The quality of gas supplied is 20-candle power, at the price of 2s. 1d. per 1000 cubic feet. The mileage of public streets is 221; but, in addition, there are other streets lighted as public which are not on the register.

The report of the deputation was approved by the Committee, who recommend accordingly to the Town Council.

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INTERESTING EXPERIMENTS IN STREET LIGHTING.

Some interesting experiments in street lighting are being carried out in Darlington, to ensure the safety of the public in thoroughfares where the tramway trolley poles have been placed in the centre of the road. The adoption of this system was the subject of much adverse criticism; but it was defended on the score of economy and efficiency. The public must, however, be protected from the dangers attending it; and accordingly Mr. J. R. P. Lunn, of the Electricity Department, and Mr. F. P. Tarrant, the Gas Engineer, have been invited to light up the poles with their respective illuminants, so that the Committee may decide on the course to be adopted. On three of the poles, Mr. Lunn has affixed an electric incandescent light, which can be varied from 8 to 25 candle power, on either side, at a height of about 9 feet; and these will be required in addition to the present lamps. On three other poles, Mr. Tarrant has erected single-burner incandescent gas-lamps at a height of about 11 feet; and these, it is understood, will be sufficient to light the thoroughfare as well. Alternative schemes are also shown by Mr. Tarrant, providing for additional lamps on either side of the road, 30 or 40 yards apart respectively, which would do away with the necessity of having lamps attached to the posts. It is an interesting competition between the two lighting departments, conceived in a friendly spirit, and it will give the public as well as the Committee an opportunity of judging between the respective merits of the lights.

An experiment in improved street lighting, specially adapted to the requirements of a good residential district without shops to aid the effect, has been arranged at Teddington by Mr. W. E. Price, the Engineer of the Hampton Court Gas Company. Incandescent gas lighting has for some years been adopted in this neighbourhood; but the street and road lanterns are in general old and placed too far apart. In the present example, a quadrilateral position has been chosen near the Parish Church, which enables the spectator at one of the points of intersection to see two lines of lighting. One is composed of Welsbach "C" burners in "Windsor" lanterns, spaced 50 yards apart, the light being rated at 80-candle power, with a gas consumption of 4 cubic feet per hour; adjoining it is a line of Kern burners, rated at 100-candle power, spaced 62 yards apart; and next comes a system of Somzée-Greyson lights, developing 120-candle power, spaced 75 yards apart. It will be noticed that the idea is to provide the same aggregate illumination in each road, while exhibiting the comparative effects of lighting of low intensity, distributed fairly thickly, and other methods up to as high an intensity as should be borne on ordinary lamp-posts. Viewing one line of lights after another, and paying attention specially to the bright circles round the lamps, and the relative depth of the shadowy stretches between, it is very evident that the first-named specimen of lighting, with Welsbach "C" burners 50 yards apart, gives the most satisfactory effect. The more diffused and gentle lighting must be preferred by wayfarers and residents alike.

GAS LIGHTING AT THE ANTIPODES.

On the night of the 3rd ult., the streets of Concord, a suburb of Sydney (N.S.W.), were for the first time lighted by gas by the Australian Gaslight Company. In order to suitably celebrate the event, a number of representative gentlemen were invited to a banquet by the Mayor (Alderman T. O. Correy), who presided. In proposing "Success to our Light," he sketched the history of the movement which had resulted in the town being illuminated by gas, and referred to the promptitude with which the work had been carried out. The Secretary of the Company (Mr. R. J. Lukey) responded to the toast, and said it afforded him much pleasure to be present as their representative, and to acknowledge the hearty manner in which their name had been received. A year ago, at the celebration which took place in connection with the substitution of the incandescent system of gas lighting for the electric light at Enfield, the present Mayor of Concord said he hoped that within twelve months from the date of that gathering 100 gas-lamps would be installed within his Municipality. Not only had he kept his promise, but had exceeded it; for the number of lamps erected was 109. He (Mr. Lukey) assured those present that from the starting of the movement the Company had done their utmost to assist the Council in the matter. Had the lighting taken place at an earlier date, however, the outlay, so far as the Company were concerned, would not have been so great. In England, the councils bore the cost of the pillars, lanterns, &c.; but as it was otherwise in Sydney, a capital outlay of at least £500 was saved to the Concord Council in connection with the installation. He mentioned, as a matter of interest, that 8500 yards of mains and service-pipes had been laid, at a cost to the Company of £1500, for which they would receive the modest net return of something less than 3 per cent. on the outlay. As his audience must be aware, much of this piping would not be employed for private lighting at present; but he felt confident that the district would go ahead as the result of the action of the Council, and that ere long the Company would be amply rewarded for their outlay. With one exception, the whole of the Municipalities within the Metropolitan area were now supplied with public lights; but, from recent indications, he thought the borough which was still the exception would soon fall into line, and complete the list. These extensions were, of course, much appreciated by the Directors and officers of the Company. In conclusion, he thanked the Mayor and those present for the kind things said of the Company, and congratulated the Council on their latest movement for the welfare of the borough.

A final dividend of 37s. 6d. per share for the working of the past year is recommended by the Directors of the Shanghai Water Company, Limited; an interim dividend of 15s. per share having been paid in July last.

THE ABOVE REPRESENTS THE SIZE OF OUR BUSINESS WHEN THE "POSITIVE" SLOT METER WAS FIRST MADE IN 1889

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IT HAS INCREASED IN RATIO TO THE ABOVE. SINCE THE POPULARITY AND PRE-EMINENCE OF THE "POSITIVE" SLOT METER BECAME PRONOUNCED

RICHMOND GAS STOVE AND METER COMPANY.

The Thirteenth Annual General Meeting of this Company was held at Warrington on Thursday—Mr. T. DWERRYHOUSE in the chair.

The SECRETARY (Mr. J. W. Slack) read the notice of meeting; and the report of the Directors, the chief features of which were given in the "JOURNAL" for the 1st inst., was presented.

The CHAIRMAN, in moving the adoption of the report, expressed the satisfaction of the Directors that, notwithstanding unfavourable weather, the Company had had a good year. As the report spoke for itself, he would not take up the shareholders' time by commenting upon it at length. With what had been brought forward from last year, there was a balance of £27,754 to dispose of. It took £5737 for the dividend on the preference share capital of 6 per cent.; the 10 per cent. dividend, £7911; depreciation of buildings, £4099; and reserve fund (which was larger than last year), £4442, making this fund £21,500, *plus* £1500 in a branch reserve fund—a very respectable total. This satisfactory state of things had not been arrived at by quietly sitting down and taking things easily. Competition was becoming much keener, and they had to work harder for what profit they realized than they did some years ago. However, the new Joint Managers—Mr. Thornton and Mr. Ransome—had occupied their positions for twelve months; and he could assure the shareholders that they fully deserved all that could be said of them. He hoped they would have them with the Company for many years, and that they would continue their good work. The travellers and the staff generally had aided the Company very much by their loyalty, and had contributed largely to the prosperity of the undertaking. For some time the Directors had been talking about concentrating the works; and they thought a change in this respect might be made on economical grounds, and for the benefit of the Company. In conclusion, he said the Company was stronger now than ever. They had a capital reserve fund, and they carried forward a good sum to equalize perhaps something else next year.

Mr. H. M. THORNTON, in seconding the motion, emphasized a few points in the accounts with reference to the reserve fund. He said it was gratifying to feel that the Company had investments and cash in the bank, and dividend declared, but not due, amounting to more than the reserve fund. Turning to the trade stocks, looking at them now and three years ago, they had gone down, in round figures, from £56,000 to £42,000, which was even better than it appeared when compared with the past year only. In the management, they had been through an extremely trying year. They had had against them bad weather, bad trade, and the adverse state of the Money Market. All departments had contributed to the good result that had been attained.

The motion was carried unanimously.

The Board of the San Paulo Gas Company recommend a final dividend at the rate of 8 per cent. per annum; making 7 per cent. for the year ended Dec. 31.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is seldom that a document of so much importance upon the subject of public lighting as that which is contained in the report given in another column, with reference to the lighting of Glasgow streets, comes under my notice. The Corporation sent a number of their members, and the officials of the department interested, to see the lines upon which lighting has developed in other cities; and they have prepared a report which is at once interesting and convincing. To begin with, they recommend the total abolition of flat-flame burners for street illumination, and the substitution for them of incandescent gas-burners. Streets which are at present lighted by electricity will remain so; but otherwise the whole city will be lighted by incandescent gas-lamps. It follows, although not expressed in the report, that the deputation do not favour the extension of electric lighting. They have used their eyes and their intellects, and have come to the only conclusion which is feasible in the existing state of knowledge upon this important branch of municipal enterprise. The consequence will be that Glasgow, from being one of the worst-lighted cities in the United Kingdom, will become one of the best. Probably the advocates of electric lighting may not care to have their prospects cut off as is suggested; and it need not be surprising if there be an effort, concurrent with the proposals of the Watching and Lighting Committee, to prevent the foreclosing of the extension of their undertaking. Upon this point, it would not be altogether out of place, though there should be a little give and take; but the important feature of the situation is that this Committee of informed public representatives have been struck with the arguments, both as to efficiency and economy, which favour incandescent gas lighting more than any other form of lighting. When we turn to the estimates which have been made up as to the cost to be entailed by the new departure, there can only be a feeling of surprise that so much public benefit will be secured by so small an expenditure. Among the details of the scheme there is one which should not be overlooked. It is that the Committee recommend the abolition of globular lanterns, and the substitution of square lanterns, from which "the full value may be obtained from the incandescent burners." In this connection, it will be remembered that the Corporation of Edinburgh recently blundered into the adoption of a globular lamp of German manufacture for their experimental extension of incandescent gas lighting. This resolution was arrived at out of their own consciousness, after considering the merits of lanterns submitted to them. The Glasgow Committee have done better, in that they put themselves to the trouble to ascertain, by personal inspection, which is the best form of lantern for giving the lighting effect. If the Glasgow Corporation be true to their deputation, we are on the eve of witnessing one of the most decided advances in public lighting which

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have taken place since gas lighting was substituted for street lighting by the old-fashioned lamps in which whale oil was burned.

Not many months ago, we had an attempt, which was successful, to dislodge a Gas Manager in Glasgow, upon charges which, when examined, were of the most trivial nature. As the local newspapers this week disclose, there was recently an attempt made to prevent the appointment of a present Manager, by means which are novel in form, also rare in fact, and altogether contemptible. To telephone to a town councillor that an applicant for a municipal post had been found in questionable company years ago is a proceeding which cannot be justified on any ground whatever. Any such statement made to a person of honour, he is bound to disregard, unless it be supported by evidence. In this case, the traducer, in the witness-box, admitted his belief now that the story was untrue. Yet he made it at a time when it was calculated, and, as Sheriff Fyfe believes, was intended, to damage the prospects of a man whose character we must take to be irreproachable—a damage, too, which would have, if it had had the effect that was intended, been irreparable. A penalty of £10 is altogether inadequate for such conduct.

The Gas Committee of the Aberdeen Town Council recently considered a scheme for an important extension of the gas-mains in the city, in order to improve the supply of gas in the central and north-western districts. The Committee unanimously approved of the scheme, and recommended its adoption to the Town Council. Since the last extension of the gas-mains in 1895, the quantity of gas manufactured annually has increased from 430 million to 650 million cubic feet—or fully 50 per cent. To meet the present deficiency in the pressure, and at the same time to provide for the future extension of the city, it is proposed to lay a trunk main direct to the large gasholder at Gallowhill, and then to lay a main, with a diameter of 30 inches, from the holder to Kittybrewster, whence it will branch off in pipes of lessening diameter, coming down to 8 inches at the extremities. The total cost of the work is estimated at £5050. It is proposed also to erect a station governor and house at Gallowhill, at an estimated cost of £480. A man will require to be stationed there, and it is proposed to erect a dwelling for him, at a cost of £450. The extensions form part of a scheme which was before the Town Council in 1901, when power was taken to borrow to the extent of £100,000 to meet prospective expenditure upon the gas undertaking. The recommendation of the Committee was considered by the Town Council on Monday. Mr. Barron asked why it was proposed to do the work by the Corporation's own workmen. Mr. Kemp, the Convener, explained that the Committee thought it would be a good opportunity for giving work to some of the unemployed. The Council unanimously adopted the recommendation.

The Dumfries Town Council had before them last week a report by the Gas Manager—Mr. G. Malam—with reference to the want of pressure throughout the town during the hours of heavy burning in winter. He suggested, as a solution of the difficulty: (1) That a larger main be laid from the works as far as the theatre; (2) that a new governor and new station meter be procured; and (3) that a new governor-house be erected. The total estimated cost was £1522. Deducting £130 as the sum likely to be received for the old station meter, the net probable cost was estimated at £1392. The Committee, being satisfied of the absolute necessity for the extensions, recommended approval of them. Mr. Currie, the Convener, moved the Council to adopt the recommendations; Mr. Thomson seconded. After a discussion as to details, the Council unanimously adopted the recommendations.

A fire occurred in the Alloa Gas-Works early yesterday (Friday) morning. Between one and two o'clock, a night-shift man observed dense volumes of smoke issuing from the roof of the purifying-house. The fire brigade were summoned, and also Mr. J. W. Napier, the Manager. The roof of the building was consumed, but no further damage of any consequence was done; the firemen, with the assistance of the staff, being able to prevent the flames spreading to the other portions of the works. The fire is believed to have been originated by the over-heating of a quantity of oxide of iron which had been lying in proximity to a wooden engine-house. The damage, which is covered by insurance, is estimated to amount to about £200.

An action arising out of a case of gas poisoning in Glasgow has been settled in the Court of Session this week. The pursuer, Mrs. M'Namara, residing at No. 139, Stockwell Street, Glasgow, sued, on behalf of herself and three children, Messrs. Anderson Brothers, plumbers and gas-fitters, for £500 as damages for the death of her husband, John M'Namara, a boot closer. The pursuer and her family resided on the second flat of the tenement. There are no gas-fittings in the building, except in a shop on the street floor. Something went wrong with the gas-fittings there, and the defenders' workmen were called in to repair them. The gas was then turned on. On the evening of Wednesday, the 6th of May last, John M'Namara went to bed in a room facing the street, in his usual health. He was found dead in bed the following day. It was averred that the cause of death was gas poisoning, and that it was brought about by the defenders' workmen having broken some of the gas-fittings in the shop. The defenders denied that the cause of death was gas poisoning, or that it occurred through the fault of their workmen. They have, however, agreed to pay the pursuer £120 in full discharge of her claim.

The Electricity Department of the Glasgow Corporation, it is announced, find themselves in so satisfactory a position that they have resolved to repay to the Gas Committee the £13,895 which was the amount of the deficit that they incurred last year, and which, it will be remembered, the Gas Committee proposed to wipe out with their surplus—holding it, however, as a debt against the Electricity Committee. This the Corporation forbade; and the sum was then placed into a suspense account. The explanation is made that the large deficit was due to exceptional circumstances, arising out of the antiquated condition of the electrical plant and the change of voltage. The latter expenditure, it is said, will not occur again. The same assurance is not given as the likelihood of the plant being always up-to-date. The renewals of machinery which is run at so severe a strain must always be a heavy item in an electrical undertaking; and it may

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not be always easy to throw the cost upon the capital account. However it may be defrayed is not our business. What we are interested in is the conclusion that deficits in future are not likely to be saddled upon the gas consumers of the city.

A theft from a prepayment gas-meter is reported from Dunfermline. A man and a boy lodged in a room in which was a meter; and the boy stole 13s. 5d. from the meter. He was brought up at the Police Court on the charge, and admitted it. It was stated that he had extracted money from the meter on three different occasions. His father having promised to refund the stolen money, the Magistrate granted the boy the privilege of the First Offenders' Act.

The Doune Lighting Company, Limited, which, being a modern and presumably up-to-date concern, disdains to use the word gas, notwithstanding that it is a Gas Company, has completed a year's working, and announces that the net profit, exclusive of £49 brought forward, amounted to £185. The Directors recommend payment of a dividend of 5 per cent., that £42 be written off the value of the works, and £13 off meter account, that £50 be added to the reserve fund, and that the balance of £39 be carried forward. They also propose to again reduce the price of gas by 5d.; making it 6s. 3d. per 1000 feet.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 12.

Sulphate of Ammonia.

Though the weather has taken a more favourable turn, the effect on the market is so far not appreciable. There has, in fact, been rather more re-selling at below current prices; but makers' quotations remain £12 10s. per ton f.o.b. Hull and £12 12s. 6d. per ton f.o.b. Liverpool and Leith. Notwithstanding the dullness of the market throughout February, exports for the month are only very slightly below those for the corresponding month of 1903 – indicating that there cannot be any large accumulation of stock in makers' hands. The forward position is still neglected; buyers not being interested, unless at a discount on prompt prices.

Nitrate of Soda.

This article is firm at 10s. 3d. to 10s. 6d. per cwt., according to quality, on spot.

LONDON, *March* 11.

Tar Products.

There has been rather more business doing during the week; but, with the exception of carbolic acid, prices have a decidedly downward tendency. In pitch, there is certainly more business doing in South Wales, especially for forward delivery; but very low prices have been accepted by sellers. In more than one instance business has been done for the early part of 1905; but this is evidently of a speculative nature. The Continental demand is still very weak for early delivery; while for forward the very low prices quoted by agents simply deter consumers from contracting. There is undoubtedly more pitch offering for forward delivery in various quarters. Probably certain contracts have been arranged for tar over the present year, which render distillers anxious to place the products of same. There has been rather more business in benzol in the North of England, where some quantities have been placed for home consumption at the equivalent of 10d. per gallon f.o.b. There is nothing whatever doing in 50-90 per cent. The market value may be taken as 7d. There is really nothing to report respecting solvent naphtha and toluol. Prices are purely nominal. Creosote is decidedly weaker, especially in the North, where there are sellers at 1¼d. per gallon for either prompt or forward. Business is reported to have been done at slightly under this figure for March-April. In London, business has been done; but the price has not transpired. It is, however, generally believed to be under the quotations recently ruling. There has been a little business done in anthracene for delivery over the last six months of the year; but prices remain very dull, and do not seem to show any signs of improvement. In carbolic, the market is in a very excited state; and it is really very difficult to fix the exact value of same. In crude, there has been a fairly good business done at 2s. at makers' works for prompt; while a large sale is reported f.o.b. London at 1s. 11½d. July-December. Makers as a rule ask 2s. 3d. and 2s. 6d. per gallon in any position, and do not seem at all anxious to sell, believing in still higher values. In crystals, London makers are reported to have realized 7¼d. and 7½d. for special packages; but the German makers are undoubtedly offering to sell 39-40 per cent. at 6¾d. on the Continent. It is therefore very difficult to fix the actual value.

The average values during the week were: Tar, 18s. to 23s. Pitch, London, 33s. 6d. to 34s.; east coast, 32s. to 33s.; west coast, 31s. 6d. to 32s. Benzol, 90 per cent., 10d. to 10½d.; 50-90 per cent., 7d. Toluol, 7d. to 7¼d. Crude naphtha, 3d. to 3¼d.; solvent naphtha, 8d. to 9d.; heavy naphtha, 10d. to 11d. Creosote, London, 1⅞d. to 1¹⁵⁄₁₆d.; North, 1¼d. to 1½d. Heavy oils, 2¼d. to 2⅜d. Carbolic acid, 60 per cent., 2s. to 2s. 1d. Refined naphthalene, £5 to £7; salts, 22s. 6d. to 25s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market closes with a very quiet tone; and there is an absence of business for either prompt or forward delivery, although during the last day or two there has been rather more inquiry. Beckton still quotes £12 16s. 3d. for prompt, but would accept £12 15s. for April-August shipment. The South Metropolitan Company still maintain their quotation at £12 18s. 9d. on their terms; but buyers will not consider business at anything like this price. There has been no

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business doing at Hull. Makers ask £12 11s. 3d. to £12 12s. 6d.; but buyers will not pay more than £12 10s. for prompt, and there does not appear to be any inquiry for forward. Sales are reported in Leith at £12 12s. 6d.; but only for limited quantities and for prompt shipment. There does not appear to be anything doing at the moment for forward. At Liverpool, several small parcels have been placed at £12 10s. to £12 12s. 6d. for prompt delivery; but business has been very limited. The general tone of the market is a little better at the close, doubtless owing to the finer weather prevailing during the last day or two.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Except that low-cut quotations continue to be made for prompt clearance in some of the inferior descriptions of round coal and engine fuel, there is still practically nothing doing in the way of forward business to indicate the probable course of prices when the large contracts for gas coal and locomotive fuel come upon the market. All that can be said at present is that the continued unsatisfactory industrial condition throughout Lancashire, and the consequent restriction of requirements for ironmaking, steam, and general manufacturing purposes, necessarily have a weakening effect upon the market; and as the demand for common house coals falls off, and deliveries for gas making purposes decrease, there is the possibility of buyers being able to purchase in quantity on more favourable terms than last year. The probability of wages troubles, following on the action taken by South Yorkshire with reference to the renewal of the Conciliation Board referred to last week, does not at present seem to be regarded with any serious apprehension. The better qualities of round coal are still moving off fairly well for house-fire purposes, with pits for the most part running pretty nearly full time, although in many cases four days per week is about an average. Prices are fairly steady at about late quoted rates, best Wigan Arley averaging 13s. and 13s. 6d. to 14s. per ton at the pit, inferior sorts of Arley and Pemberton four-feet 11s. and 11s. 6d. up to 12s. 6d., and common house-fire coals 9s. and 9s. 6d. up to 10s. 6d. The demand for steam and forge qualities continues only moderate; and some of the inferior sorts, or where special sales have to be made, are to be bought from about 7s. 9d. to 8s. per ton, with ordinary quotations, according to quality, ranging from 8s. 3d. and 8s. 6d. to 8s. 9d. per ton. Better sorts of engine fuel are moving off moderately well, and there is no great surplus of slack at collieries in the Lancashire district; but there is a keen competition with engine fuel offering from Derbyshire and Yorkshire, which has a weakening effect upon the lower descriptions. Best slacks are still quoted from 6s. and 6s. 3d. up to 6s. 9d. per ton at the pit, medium sorts 5s. to 5s. 6d., and common slacks about 4s. to 4s. 6d., with Derbyshire slack offering from as low as 1s. 6d. and 1s. 9d. upwards. In the shipping trade, there is a fair business passing through, but only at low figures ranging from 9s. and 9s. 3d. per ton for ordinary qualities, up to 9s. 6d. and 9s. 9d. for the better sorts of steam coal delivered at the Mersey ports or the Manchester Ship Canal.

Northern Coal Trade.

The coal trade of the North is still quiet; but as the shipping season draws nearer, there are more forward orders being booked, and the prospect is a little brighter—more especially in a promise for the fuller working of the steam coal collieries. Best Northumbrian steam coals are a little firmer at 9s. per ton f.o.b., second-class steams are 8s., and steam smalls plentiful at about 3s. 6d. The gas coal trade experiences some diminution in consumption. For occasional cargoes, the price is from 7s. 9d. to 8s. 6d. per ton f.o.b., according to quality. The contracts being settled are at prices that vary a good deal; but about 8s. per ton f.o.b. may be looked on as a fair average. Coke is steady; and the diminished production and heavy shipments of gas coke tend to sustain its price, which may be put as from 13s. 6d. to 13s. 9d. per ton f.o.b. for good qualities.

Scotch Coal Trade.

Trade continues with little life in it, and almost changeless. Supplies are plentiful; and for some sorts prices show a tendency to shade off. Orders for shipments are scarce. Sales being so large for home puposes seems to indicate that trade is picking up at last. The prices quoted are: Main, 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 3d. to 9s., and splint 8s. 9d to 9s. The shipments for the week amounted to 169,030 tons—a decrease of 14,348 tons upon the previous week, and of 83,977 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,582,676 tons—a decrease of 88,701 tons upon the same period of last year.

The Directors of the East London Water Company recommend a dividend at the rate of 8 per cent. per annum (less income-tax) for the half year ended Christmas last, carrying forward £4145.

According to the report which will be presented at the general meeting of Messrs. C. & W. Walker, Limited, on the 24th inst., the net profits on the trading in the year ending Jan. 31, after providing for reserves, depreciation, &c., amounted to £9861. This, added to £6548 brought forward, makes a total of £16,409. Deducting the interim dividend of £1100 paid to the preference shareholders, and £2000 paid to the ordinary shareholders, there remains an available balance of £13,309. Out of this the Directors propose to pay a dividend for the six months ending Jan. 31, at the rate of 5½ per cent. on the preference shares and 10 per cent. (free of income-tax) on the ordinary shares, and allow a bonus of 2s. per share, also free of income-tax, on the latter shares. After these payments, there will be left a balance of £6209 to be carried forward. It is satisfactory to find from the report that, notwithstanding the depression in trade and some competition, the Company's works are fairly well employed.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000	TORONTO (Fourth Contract)	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract), 1,800,000 C. Ft. HAMILTON, ONT., 400,000 C. Ft.

Sales of Shares.—Some original stock of the Faversham Gas Company (last dividend 7 per cent.) was sold a few days ago, in lots of £100, at £135 and £140 per lot. Last Tuesday, several shares in the Lewes Water Company were sold under a will. Three £25 shares (10 per cent.) fetched £64 apiece; and some £20 parcels of 5 per cent. preference stock realized £30 and £31 each, and a £30 lot sold for £40. On Thursday, Messrs. Alexander, Daniel, and Co., sold by auction, in accordance with the announcement made in our advertisement columns, £15,000 of 7 per cent. maximum consolidated stock of the Bristol Water Company. It was put up in £100 lots, and the lowest price realized was £149, and the highest £150 15s.; the average being £149 8s. 10·4d. The whole of the stock was sold, and produced £22,416 10s.

The Gas-Stove Business in Dublin.—The Alliance and Dublin Consumers' Gas Company are to be congratulated on the manner in which they have gone ahead. They have not only made up for the loss of consumption due to the use of electricity for lighting, but they have, by the consistent practice of up-to-date methods, judicious advertisements, attention to the importance of stoves, and by widening the area of supply by the free fixing of slots, vastly increased their output. In less than five years, over 15,000 complete slot installations (consisting of gas-stove, pendants, and brackets), nearly 5000 of the best class cookers and 2500 gas-fires have been fixed on hire, in addition to which many have been sold outright. All this has not been done without work. A noteworthy fact is that during the past four years out of the large number of stoves in use, the Company have not had to replace a single one, and no new ones have been purchased while an old one has been in stock. In connection with the Company's splendid show-room in Grafton Street, a large trade has been developed in high-class and ornamental gas-fittings, as well as incandescent burners, in connection with which the Company have a scheme of maintenance. The results in every way have been so satisfactory that the Directors have decided to renew their contract with the Richmond Gas Stove and Meter Company, Limited, which includes management of the show-rooms and the supply and fixing of the stoves and installations. The latter Company will also, as in the previous contract, maintain in perfect working order all cookers and fires out on hire. That the latter provision has materially added to the profitable nature of the Stove Department cannot be doubted; and this is a point which other gas suppliers would do well to note.

Monte Video Water-Works Company, Limited.—At the meeting of the Company on Thursday, the Directors will report that the revenue account for the year 1903, compared with that for the previous year, shows an increase of £5668 in income and of £1657 in working expenses. The net revenue consequently exhibits an improvement of £4011; being £62,281 last year against £58,270 in 1902. After paying debenture interest and other charges, writing off the cost of repairs and alterations to the new premises (£2578), and placing £10,000 to the depreciation fund, for the renewal of buildings, plant, &c., there remains an available balance of £44,372. An interim dividend of 2½ per cent. was paid on the 2nd of November; and the Directors recommend a further dividend of 2½ per cent. (making 5 per cent. for the year, free of income-tax)—carrying forward a balance of £24,372. The Directors point out that the increase in the revenue is largely due to increased sales of water during the drought that prevailed for the last three months of the year. The increase in the profits available for distribution would, under normal circumstances, have justified the Directors in recommending an increased dividend on the share capital. They consider, however, that, in view of the fact that the Company's revenue will be temporarily affected by the reduction of rates which will come into force when the present *ad referendum* contract with the Government is approved by the Chambers and becomes effective, and also having regard to the present disturbed state of politics in the country, the more prudent course would be to adhere for the present to the usual dividend of 5 per cent. They have placed to depreciation account the large sum of £10,000, as they have in contemplation extensive improvements to the pumping plant at Santa Lucia, the total cost of which, it is estimated, will be covered by the amount named.

At the forthcoming meeting, the Directors of the British Gaslight Company, Limited, will recommend a dividend at the rate of 10 per cent. per annum for the half year ended Dec. 31, free of income-tax.

The Southwark and Vauxhall Water Company, as will be seen by an announcement which appears in our advertisement columns, are inviting tenders for an issue of 3 per cent. "B" debenture stock and "intercommunication" debenture stock.

Messrs. J. & J. Charlesworth, Colliery Proprietors, of Wakefield, have placed with Messrs. Graham, Morton, and Co., Limited, a large order for a complete coal-screening plant, including the whole of the steel structural buildings, roofing, picking-belts, tippers, &c., having a capacity of 3000 tons a day. The installation is for the Kilnhurst pit, Rotherham.

The Directors of Stewarts and Lloyds have decided to recommend that the following dividends be paid for the half year ending Dec. 31 last: At the rate of 6 per cent. per annum on the preference shares, and 11 per cent. per annum on the ordinary shares. They also recommend placing £25,000 to the reserve fund, and £30,000 to the depreciation fund, and carrying forward £52,900.

The body of a man brought up in the Clyde at Glasgow early last week by a dredger has been identified as that of Mr. Clement Hamilton, bricklayer, of Hamilton, who disappeared five months ago. He carried on a large business, especially in the erection of retort-benches in gas-works, many of the largest of which, in Scotland, Ireland, and the North of England, he built or reconstructed. He was widely known and much esteemed.

At the meeting of the Gas Committee of the Manchester Corporation on Friday, an illuminated address was presented to Mr. James Whittaker, the senior collector of the department, expressing regret at his retirement, and high appreciation of the faithful and efficient manner in which he had discharged his duties during the last 57 years. The address bore the signatures of Alderman Gibson, the Chairman of the Committee, and Mr. C. Nickson, the Secretary of the Department.

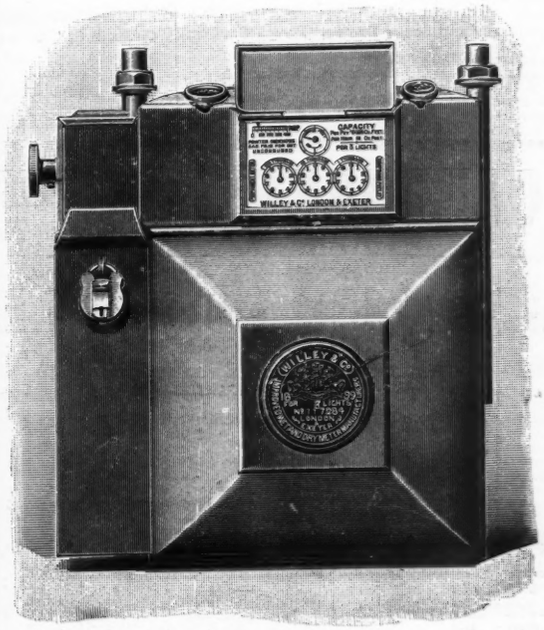
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD., LONDON & EXETER.

The Bury and District Joint Water Board have resolved that, as from the 24th of June next, all schools, churches, and chapels shall be supplied with water by meter.

At the recent annual meeting of the Bristol Water Company, it was decided to give a sum not exceeding £500 to the family of the late Mr. H. W. Pearson, who had held for 31 years the position of Resident Engineer to the Company.

The Chapel-en-le-Frith Rural District Council have decided to ask the sanction of the Local Government Board to the purchase by them of the Dove Holes Water-Works for £6750, the Chapel-en-le-Frith Water-Works for £5200, and the Town End Water-Works for £1100. Power is also to be sought to supply water to the adjoining urban district of Fairfield.

In connection with some comparative statistics recently published as to the gas supply in Southport and the adjacent places during the quarters ended Dec. 31, 1902 and 1903, the fact came out that prepayment meters were apparently losing their popularity. It was, however, attributable to the circumstance that certain original patrons of slot meters had become so accustomed to using gas that they had given them up in favour of a regular supply and a quarterly account. There are, of course, still a large number of prepayment meters used, notably in the smaller residences; and they are found to be very serviceable.

The Liverpool and London Meter Company (1904), Limited, has been registered with a capital of £10,050 in 10,000 ordinary shares of £1 each and 1000 deferred shares of 1s. each, to acquire the business now carried on by the Liverpool and London Meter Company, Limited; to adopt an agreement with W. Constable, J. H. Cheshire, A. L. R. Rathbone, J. C. Wood, T. Wardlaw, H. D. Cheshire, and J. Cheshire; and generally to engage in any description of engineering work, and to manufacture meters and other articles, whether under any patent belonging to the Company or otherwise.

At the fifth annual meeting of Messrs. James Milne and Son, Limited, next Friday, the Directors will have the pleasant duty of reporting that the result of the operations of the Company in the year ending the 31st of December shows a considerable improvement on that of the previous twelve months; the net profit earned being sufficient to extinguish the debit balance brought forward at the close of 1902, and provide for the payment of a dividend on the preference shares. The net profit for the year, after meeting all charges of the business and providing for depreciation, amounts to £5564. After deduction of the debit balance (£3080), there remains at the credit of the profit and loss account £2484, from which the Directors recommend the payment of a dividend of 2½ per cent. on the preference shares for the past half year, amounting to £2375, and leaving a balance of £109 to be carried forward.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

SECRETARY. Southampton Gas Company. March 26.
SECRETARY. Reading Gas Company. March 26.
MANAGER. Leeds Gas Department. March 22.
GAS AND WATER MANAGER. Coleraine Urban District Council. April 2.
WORKING MANAGER. Rhymney and Aber Valleys Gas and Water Company.
ASSISTANT TO ENGINEER (RIVER PLATE). Hugo Brown and Co., Liverpool.
FOREMAN (GAS WORKS). No. 4182.
FOREMAN (PURIFYING OPERATIONS). No. 4181.
HANDY MAN (EAST COAST). No. 4179.

Situations Wanted.

ASSISTANT MANAGER. No. 4178.

Plant, &c., for Sale.

CONDENSER (250,000 feet). Redditch Gas-Works.
EXHAUSTER AND STEAM ENGINE. Brecon Gas Company.
SATURATOR. No. 4180.
STATION METER AND GOVERNOR. Williams & Co., Stoke-on-Trent.
STATION METER. Mansfield Gas Department.
STATION METER. Tunbridge Wells Gas Company.
WATER WORKS PUMPING PLANT, &c., ENGINES, AIR COMPRESSOR, &c. Wallasey Urban District Council.

Company Meeting.

EAST LONDON WATER COMPANY. Offices, March 24. Twelve o'clock.

Sales of Stocks and Shares.

SOUTHWARK AND VAUXHALL WATER COMPANY. March 22.
TOTTENHAM AND EDMONTON GAS COMPANY. April 25.

TENDERS FOR

Brass and Copper Work.

PERTH GAS DEPARTMENT. Tenders by March 28.

Coal.

PERTH GAS DEPARTMENT. Tenders by March 28.

Exhauster and Engine.

CHORLEY GAS DEPARTMENT. Tenders by March 22.

Fire-Clay Goods.

COLNE GAS DEPARTMENT. Tenders by March 21.

General Stores, Paints, Oils, Cement, &c.

PERTH GAS DEPARTMENT. Tenders by March 28.

Lime.

PERTH GAS DEPARTMENT. Tenders by March 28.

Meters.

PERTH GAS DEPARTMENT. Tenders by March 28.

Oil for Gas Making.

CARLISLE GAS DEPARTMENT. Tenders by March 24.

Oxide of Iron.

CARLISLE GAS DEPARTMENT. Tenders by March 24.

Pipes and Specials, &c.

DEVONPORT GAS DEPARTMENT. Tenders by March 31.
PERTH GAS DEPARTMENT. Tenders by March 28.

Retort-House Floor.

SALFORD GAS DEPARTMENT. Tenders by March 31.

Sulphuric Acid.

PERTH GAS DEPARTMENT. Tenders by March 28.

Tar and Ammoniacal Liquor.

CARLISLE GAS DEPARTMENT. Tenders by March 24.
HAWORTH URBAN DISTRICT COUNCIL. Tenders by March 24.
TENTERDEN GAS COMPANY.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 685.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	19–20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13–14	..	5 7 2
200,000	5	Nov. 12	6½	Bombay, Ltd.	5½–6	..	5 8 4
140,000	5	,,	6½	Do. New, £4 paid	4–4½	..	5 15 7
380,000	Stk.	Feb. 25	12	Brentford Consolidated	222–227	..	5 5 9
300,020	,,	,,	9	Do. New	167–172	..	5 4 8
50,000	,,	,,	5	Do. 5 p.c. Pref.	127–132	..	3 15 9
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	103–108	..	3 14 1
220,000	Stk.	Mar. 10	10¾	Brighton & Hove Orig.	202–207*	+2½	5 3 10
246,320	,,	,,	7½	Do. A. Ord. Stk.	142–147*	+2½	5 5 5
460,000	20	Oct. 15	10	British.	37⅛–38½	..	5 3 11
100,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	112–117	..	5 2 7
165,700	,,	,,	4½	Do. do. 3½ p.c.	85–90	..	5 0 0
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd	10⅛–10⅜	..	6 10 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	91–93	..	4 6 0
150,000	20	Mar. 10	8½	Cagliari, Ltd.	21–23*	..	7 3 6
100,000	10	June 11	10	Cape Town & Dis., Ltd.	14–15	..	6 13 4
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	52–54	..	5 11 1
1,375,000	Stk.	Feb. 25	5 7/10	Commercial 4 p.c. Stk.	102–107	..	4 17 3
536,485	,,	,,	5	Do. 3½ p.c. do.	97–100	..	5 0 0
442,947	,,	Dec. 11	3	Do. 3 p.c. Deb. do.	84–87	..	3 9 0
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	103–108	−7	6 9 8
200,000	,,	,,	7	Do. 7 p.c. Pref.	130–135	..	5 3 8
575,000	Stk.	Feb. 25	5½	Crystal Palace Ord. 5 p.c.	108–113	..	4 14 4
60,000	,,	,,	5	Do. 5 p.c. Pref.	115–120	..	4 3 4
112,533	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	134–137	..	3 13 10
486,090	10	Jan. 28	10½	European, Ltd.	18–19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13–14	..	5 12 6
15,243,200	Stk.	Feb. 11	4 1/10	Gas-light and Coke — 4 p.c. Ord.	86–88	..	5 0 0
2,600,000	,,	,,	3½	3½ p.c. max.	87–89	..	3 18 8
3,799,735	,,	,,	4	4 p.c. Con. Pref.	103–106	−1½	3 15 6
4,193,975	,,	Dec. 11	3	3 p.c. Con. Deb.	85–87	..	3 9 0
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	88–93*	+½	5 7 6
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16–17	..	6 9 5
3,800,000	Stk.	Nov. 12	10	Imperial Continental	191–194	−1	5 3 1
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	97–99	..	3 10 8
165,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	103–108*	+1	5 11 1
561,000	Stk.	Feb. 25	10	Liverpool United A	209–211	..	4 14 9
718,100	,,	,,	7	Do. do. B	158½–160½	..	4 7 3
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	108–110	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd.	4¼–4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of — 5 p.c. Deb.	101–105	..	4 15 3
250,000	100	,,	4½	Melbourne — 4½ p.c. Deb.	101–103	..	4 7 5
541,920	20	Nov. 12	3½	Monte Video, Ltd.	9–10	..	7 0 0
1,515,892	Stk.	Feb. 26	4½	Newc'tle & G'tesh'd Con.	106–108	..	4 3 4
406,025	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	94–95	..	3 13 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	135–140	..	5 14 4
600,000	5	Sept. 30		Ottoman, Ltd.	5–6	..	5 16 8
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	Ply'mth & St'house 5 p.c	121–126	..	4 17 2
851,070	10	Oct. 15	7	River Plate Ord.	11¼–11⅜	..	5 19 2
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92–94	..	4 5 1
250,000	10	Sept. 30	7†	San Paulo, Ltd.	10⅜–11⅛	..	6 1 9
135,000	Stk.	Sept. 11	10	Sheffield A	241–243	..	4 2 4
209,984	,,	,,	10	Do. B	240–242	..	4 2 8
523,498	,,	,,	10	Do. C	239–241	..	4 3 0
116,106	Stk.	Sept. 30	5	Shrewsbury Ord. 5 p.c.	109–112	..	4 9 3
6,150,000	Stk.	Feb. 11	5⅛	South Met., 4 p.c. Ord.	116–118	..	4 10 4
1,832,700	,,	Jan. 14	3	Do. 3 p.c. Deb.	85–88	..	3 8 2
380,940	Stk.	Nov. 12	5	Southampton Ord.	105–110	..	4 10 11
87,950	,,	Jan. 14	4	Do. 4 p.c. Deb.	100–103	..	3 17 8
120,000	Stk.	Feb. 25	6	Tottenham and Edmonton — A. 5 p.c.	112–117	..	5 2 7
313,020	,,	,,	4½	B. 3½ p.c.	93–98	..	4 11 10
182,380	10	Dec. 30	8	Tuscan, Ltd.	8–9	..	8 17 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97–99	..	5 1 0
745,872	Stk.	Mar. 10	5	West Ham, 5 p.c. Ord.	94–97*	+½	5 3 1
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	Chelsea, Ord.	350–355	..	3 7 7
150,000	,,	,,	5	Do. 5 p.c. Pref.	142–147	..	3 8 0
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	132–137	..	3 5 8
175,785	,,	Sept. 30	4½	Do. 4½ p.c. Deb.	132–137	..	3 5 8
1,720,560	Stk.	Oct. 15	8	East London, Ord.	220–225	..	3 11 1
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	133–138	..	3 5 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	87–90	..	3 6 8
700,000	50	Dec. 11	10	Grand Junction — 10 p.c. max.	135–138	..	3 12 6
310,000	Stk.	Sept. 30	4	4 p.c. Deb.	115–120	..	3 6 8
708,000	Stk.	Feb. 25	10	Kent	315–320	..	3 2 6
160,000	,,	,,	7	Do. New, 7 p.c. max.	215–220	..	3 3 7
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	311–316	..	3 9 7
406,200	100	,,	8½	Do. 7½ p.c. max.	227–232	..	3 13 3
950,000	Stk.	Sept. 30	4	Do. 4 p.c. Deb.	115–120	..	3 6 8
500,000	100	Feb. 25	10	New River, New Shares	375–385	..	2 11 11
1,000,000	Stk.	Jan. 28	4	Do. 4 p.c. Deb.	116–119	..	3 7 3
902,300	Stk.	Dec. 30	7½	South-wark and Vauxhall — Ord.	273–278	+3	2 13 9
126,500	100	,,	7½	7½ p.c. max.	215–225	..	3 6 8
489,200	Stk.	,,	5	5 p.c. Pref.	142–147	..	3 8 0
1,019,585	,,	Oct. 15	4	4 p.c. A Deb.	115–120	..	3 6 8
1,155,066	Stk.	Dec. 11	10	West Middlesex.	292–297	+2	3 7 4
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	130–135	..	3 6 8
200,000	,,	Mar. 10	3	Do. 3 p.c. Deb.	87–90*	+½	3 6 8
				* Ex div.			

† Next Dividend will be at this rate.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

SULPHATE OF AMMONIA

SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

"NUGEPE" CEMENT.

JOHN E. WILLIAMS AND CO.,

VICTORIA PAINT WORKS, MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.

MELROSE CYCLE COMPANY, COVENTRY.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS

PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.

Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

APPOINTMENT wanted as Assistant- MANAGER in Gas-Works. Trained at Engineering Works. Recently prepared Drawings and Superintended erection of large up-to-date Gas-Works. Good knowledge of Chemistry and Gas-Works Routine. Honours Gas Manufacture.

Address No. 4178, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, at a Sea-Side Town (East Coast), a Smart all-round HANDY MAN, used to Fitting in Compo., Brass, or Iron. Quick at Fixing Meters, Stoves, and Main and Service Laying. Must be Reliable and Steady.

Apply, by letter, stating Age, where employed, and Wages required, together with Testimonials, to No. 4179, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.

Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

WANTED, a young Man, as Under ENGINEER to the Rosario Gas-Works, River Plate.

Salary, £150 for first year, with Bedroom at Works.

Apply to HUGO BROWN AND CO., 13, Castle Street, LIVERPOOL.

FOREMAN OVER PURIFYING OPERATIONS.

REQUIRED, a competent Man used to Oxide and Lime Purification.

Apply, stating Age, previous Employment, and Wages required, to No. 4181, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

RHYMNEY AND ABER VALLEYS GAS AND WATER COMPANY.

WANTED, a Working Manager for a Gas-Works making about 17 Million Cubic Feet of Gas per annum. Must thoroughly understand the routine of a Gas-Works, and must be an efficient Main and Service Layer, Gas-Fitter, and Plumber.

Salary £2 2s. per Week, together with House, Coal, and Gas.

Apply, in own handwriting, stating Age, and References, to the undersigned on or before the 19th inst.

ALBERT R. CAWLEY,
General Manager.

Gas and Water Offices, St. Martin's Road, Caerphilly, near Cardiff.

SOUTHAMPTON GASLIGHT AND COKE COMPANY.

APPOINTMENT OF SECRETARY.

THE Directors of this Company are desirous of receiving APPLICATIONS for the appointment of SECRETARY to this Company from Candidates who have had practical experience in such an office. No application will be considered from anyone who has not had such experience.

Applications to be sent in not later than the 26th of March, accompanied by four recent Testimonials, addressed to the undersigned.

The person appointed will have to devote the whole of his time to the office.

Commencing Salary, £400 per annum.

Applicants to state at what date they could commence the duties.

Notice will be sent to selected Candidates.

The appointment will be made on the 6th of April.

By order,
C. CROWTHER SMITH,
Secretary.

Ogle Road, Southampton,
March 2, 1904.

OXIDE OF IRON.

(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL.

5, CROOKED LANE, LONDON, E.C.

COAL GAS TAR wanted.

BEST PRICES GIVEN.

SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.

SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."

Telephone: 341 AVENUE.

WANTED, for a Gas-Works in the North Midlands, a competent and reliable man as FOREMAN. Must have had experience in the management of Workmen, also of Inclined Settings of Retorts. Age, between 25 and 35. Annual make, 120 Millions.

Applications to be sent in not later than the 19th inst., with *copies* of not less than three recent Testimonials, and stating Wages required, to No. 4182, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

URBAN DISTRICT OF COLERAINE, COUNTY LONDONDERRY.

GAS AND WATER MANAGER WANTED.

THE Coleraine Urban District Council invite APPLICATIONS for the appointment of GAS AND WATER MANAGER, at a salary of £120 per annum, with free House, Light, and Fuel.

Security will be required in the sum of £200; and the person appointed must devote his whole time to the duties attached to the combined offices.

Applications, with *copies* of Testimonials, to be lodged with me not later than Four o'clock on Saturday, the 2nd day of April. 1904.

WM. HENRY,
Clerk of the Council.

Town Hall, Coleraine, Co. Londonderry,
March 10, 1904.

READING GAS COMPANY.

APPOINTMENT OF SECRETARY.

THE Directors of the Reading Gas Com- pany invite APPLICATIONS for the vacant post of SECRETARY to the Company.

The Secretary will have the control of the Staff at the Central Offices, and, in addition to the usual secretarial duties, he will be responsible for the proper keeping of the accounts of the Company.

Candidates should make applications in their own handwriting, stating Age, Qualifications, and Salary expected, with not more than three recent Testimonials as to character and abilities.

Preference may be given to Candidates who have had Experience in Gas Accountancy and Administration.

Applications must be received not later than Saturday, March 26, 1904; and they should be addressed to THE CHAIRMAN, The Gas Company's Offices, King Street, READING.

CITY OF LEEDS.

THE Gas Committee are prepared to receive Applications for the position of MANAGER of the New Wortley Gas-Works.

Salary £300 per Annum, with House, Coal, and Gas.

Candidates must not be over 40 years of age, and must possess thorough knowledge of Gas Manufacture, and be experienced in the working of both Inclined and Horizontal Retorts with Machinery.

Applications, endorsed "Gas Manager," stating Age, Qualifications, and Particulars of Experience, with *copies* of not more than three recent Testimonials, to be sent to the undersigned on or before Tuesday, the 22nd inst.

Canvassing members of the Council will be deemed a disqualification.

ROBERT E. FOX,
Town Clerk.

Town Hall, Leeds,
March, 1904.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

TO SUBSCRIBERS.

ROBERT DEMPSTER & SONS, LTD., of Rose Mount Iron-Works, Elland, Yorkshire, beg to inform Subscribers to the "Journal of Gas Lighting," that the series of COLLOTYPE VIEWS OF GAS PLANT executed by them is being issued in the form of inserted sheets fortnightly, Five of which have already been published, and respectfully suggest that SUBSCRIBERS SHOULD PRESERVE THE WHOLE SERIES FOR FUTURE REFERENCE.

FOR SALE—A 40,000 cubic feet Station METER, by Wright.
Further Particulars on application to the Engineer, Gas-Works, Tunbridge Wells.

CONDENSER for Sale. In splendid Condition. Cheap. Capacity 250,000 Cubic Feet per Twenty-four hours.
Apply to A. E. Layton, Manager, Gas-Works, Redditch.

SATURATOR, new, to be Sold cheap. Of 2½ inch Pitch Pine, lined with ⅜ in. by ¼ in. Chemical Lead. Substantially and well made.
Apply, by letter, to No. 4180, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO BE SOLD—New Single Gasholder, 50 feet diameter by 15 feet deep, with Six Wrought-Iron Standards, top Ties, and Suspension Gear if needed. Ready for erection.
Write J. Wright, 181, Queen Victoria Street, London, E.C.

FOR SALE—A 500-Light Wet Cylin- drical STATION METER, with Cast-Iron Cradle. Complete with Three 6-inch Valves and Connections. Practically new.
Apply Arthur Graham, Gas and Water Engineer, Mansfield.

FOR SALE—One Station Meter, 5 feet diameter, by Braddock, with 6-inch Valves. Also One Braddock GOVERNOR, with 7-inch Inlet and Outlet Pipes, Bye-Pass, and Valves.
Apply to H. J. Williams and Co., Kidsgrove, Stoke-on-Trent.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

FOR SALE, a bargain, Exhauster and STEAM-ENGINE combined, by Allen, London, to pass 5000 cubic feet per hour. All Connections complete. May be seen at the Brecon Gas-Works.
For further Particulars, apply to the undersigned.
Wm. A. Wright,
Secretary.
Brecon Gas Company,
March 8, 1904.

FOR SALE, Cheap, the following good Second-Hand Gas Plant:—
LIVESEY'S PATENT WASHER to pass 250,000 cubic feet per diem. 8-inch Connections.
COCKEY'S PATENT WASHER to pass 100,000 cubic feet per diem. 6-inch Connections.
KIRKHAM'S PATENT WASHER to pass 150,000 cubic feet per diem. 5-inch Connections.
W.I. SCRUBBER, 20 feet high by 3 feet diameter.
Two 8 feet square PURIFIERS, with 8-inch Valves complete.
Also various other GAS PLANT. Inquiries invited.
Apply to Samuel While and Son, 60, Queen Victoria Street, London, E.C.

GOOD GAS PLANT for Sale, Cheap:—
GASHOLDER AND CAST TANK, 40,000 cubic feet capacity, re-fixed cheap; also other sizes.
NEW HOLDERS, STEEL TANKS, made and tendered for.
PURIFIERS—Sets of 4 feet, 5 feet, 6 feet, 8 feet, 10 feet, 12 feet, and 18 feet square. Set of Four PURIFIERS, 22 feet by 18 feet, good.
SCRUBBERS—Single and in pairs, 6 feet by 28 feet, 8 feet by 60 feet, 10 feet by 60 feet.
WASHERS—"Livesey," "Clapham," "Holmes," overhauled.
METERS—Governors up to 18 inches. New Drums.
EXHAUSTERS, ENGINES up to 60,000 cubic feet per hour in Stock.
Buy from the largest Dealers in Second-hand Plant, and who guarantee to leave all Apparatus sold in good working order and satisfactory to the Company.
J. Firth Blakeley and Co., Thornhill, Dewsbury.

TENTERDEN GAS COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the above Company are prepared to receive TENDERS for the surplus TAR at their Works.
Further Particulars as to quantity can be had on applying to the Manager, Mr. W. S. Bark, Gas-Works, Tenterden.

THE Haworth Urban District Council are prepared to receive TENDERS for the purchase of their surplus TAR and LIQUOR during the Year ending March 31, 1905.
Tenders to be sent in not later than the 24th of March.
William Robertshaw,
Clerk.
North Street, Keighley.

DEVONPORT CORPORATION.
(Gas Department.)

THE Gas Committee of the Devonport Corporation are prepared to receive TENDERS for the manufacture and delivery of 3000 yards of 3-inch PIPES, 1800 yards of 4-inch PIPES, 1200 yards of 6-inch PIPES, and sundry SPECIALS.
Specification, Bill of Quantities, and Form of Tender may be obtained on application to the undersigned.
Sealed Tenders, on Form embodied in the Specification, endorsed "Tender for Pipes, &c.," to be delivered to the Town Clerk, Devonport, not later than the 31st day of March, 1904.
The Committee do not bind themselves to accept the lowest or any Tender.
Sidney E. Stevenson,
Engineer and Manager.
Gas-Works, Devonport.

CITY OF CARLISLE.

TENDERS FOR GAS OIL.

THE Gas Committee are prepared to re- ceive TENDERS for the supply of about 1000 (One Thousand) Tons of GAS OIL, for the Manufacture of Carburetted Water Gas, during a period of One Year from March 26 next.
Tenders, endorsed "Gas Oil," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk not later than March 24, 1904.
Forms of Tender and other Particulars on application.
The lowest or any Tender will not necessarily be accepted.
By order,
W. J. Smith, B.Sc.,
Engineer and General Manager.
Gas-Works, Carlisle,
March 11, 1904.

CITY OF CARLISLE.

TENDERS FOR PURCHASE OF TAR.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus Coal and Water Gas TAR, to be produced at their Works for a period of One Year from March 26 next.
Tenders, endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Town Clerk, not later than March 24, 1904.
Further Particulars may be obtained on application.
The Committee do not bind themselves to accept the highest or any Tender.
By order,
W. J. Smith, B.Sc.,
Engineer and General Manager.
Gas-Works, Carlisle,
March 11, 1904.

CITY OF CARLISLE.

TENDERS FOR OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply to their Works of about 200 Tons of OXIDE OF IRON. Delivery to be made over a period of One Year from March 26 next.
Tenders, endorsed "Oxide of Iron," to be addressed to the Chairman of the Gas Committee, and delivered at the Office of the Town Clerk, not later than March 24, 1904.
Further Information may be had on application.
No pledge is given for the acceptance of the lowest or any Tender.
By order,
W. J. Smith, B.Sc.,
Engineer and General Manager.
Gas-Works, Carlisle,
March 11, 1904.

WALLASEY URBAN DISTRICT COUNCIL.
(Gas and Water Department.)

SALE OF WATER-WORKS PUMPING PLANT.

THE Wallasey Urban District Council are prepared to receive OFFERS for the undermentioned WATER-WORKS PUMPING PLANT which they have to dispose of:—
One compound, jet-condensing BEAM ENGINE, with 20-in. high and 30-in. low pressure Cylinders (both 6 ft. stroke), and Lift and Force Pumps, each 18-in. diameter by 6 ft. stroke. This plant has a capacity of 750,000 gallons per twenty-four hours, and was built by Brassey's, Birkenhead, in 1875.
Also one jet-condensing BEAM ENGINE, with 6 ft. stroke, and Lift and Force Pumps, each 18-in. diameter by 6 ft. stroke. This plant was built by Melling in 1860, and has a capacity of 500,000 gallons per twenty-four hours.
Also two-stage AIR-COMPRESSOR, to work up to 150-lbs. air pressure, with two Steam Cylinders each 16-in. diameter and high and low pressure Air Cylinders of 16-in. and 9-in. diameter respectively, and a stroke common to all of 20-in.
The whole of the above-mentioned plant is in first-class running order, and is for sale consequent upon the closing of the Council's Pumping-Station at Poulton-cum-Seacombe.
Permission to view, and all further Particulars may be obtained on application to the Engineer, Mr. J. H. Crowther, at the Gas-Works, Great Float, near Birkenhead.
Offers may be sent in for the whole or any part of the Plant, and must be endorsed, "Tender for Pumping Plant," and delivered per post at my Office as below.
By order,
H. W. Cook,
Clerk and Solicitor.
Public Offices, Egremont,
Cheshire, March 1, 1904.

BOROUGH OF CHORLEY.
(Gas Department.)

THE Corporation are prepared to con- sider TENDERS for the Supply, Delivery, and Erection, upon their foundations, at their Gas-Works, Water Street, Chorley, of One 40,000 cubic feet per hour GAS EXHAUSTER, with HORIZONTAL STEAM-ENGINE.
Specification, &c., and all Particulars, may be obtained from Mr. J. W. Allin, Gas Engineer, Chorley.
Tenders, endorsed "Exhauster," to be addressed to the undersigned, and delivered not later than Tuesday, the 22nd of March, inst.
The Corporation do not bind themselves to accept any Tender.
By order,
Jno. Mills,
Town Clerk.
Town Hall, Chorley, March 3, 1904.

PERTH GAS DEPARTMENT CONTRACTS—1904-5.

COAL, LIME, PYRITES ACID, CAST-IRON AND MALLEABLE-IRON PIPES, BRASS AND COPPER WORK, METERS, PAINTS, OILS, CEMENTS, GENERAL STORES, AND SUNDRY FURNISHINGS.

MR. JOHN BEGG, Town Clerk, will receive sealed and endorsed Tenders for the above on or before Monday, the 28th of March, at ten a.m.
Specifications, Schedules, and full Particulars from the undersigned.
W. B. M'Lusky,
Engineer and Manager.
Perth, March 12, 1904.

BOROUGH OF COLNE.
(Gas Department.)

RETORTS AND FIRE-CLAY GOODS.

THE Gas Committee invite Tenders for the supply of the necessary FIRE-CLAY GOODS required during the present Year, Particulars of which can be obtained on application to the undersigned.
Tenders, endorsed "Retorts," to be addressed to the Chairman of the Gas Committee, Gas-Works, Colne, Lancs., and delivered not later than Monday noon, March 21, 1904.
The Committee do not bind themselves to accept the lowest or any Tender.
Fred. Thorpe,
Engineer and Manager.
Colne, Lancs., March 7, 1904.

COUNTY BOROUGH OF SALFORD.
(Gas Department.)

THE Gas Committee invite Tenders for the supply and erection of a RETORT-HOUSE FLOOR, &c., required at the Liverpool Street Works.
The Drawings may be seen, and copies of the Specification and Form of Tender obtained (for which a charge of 21s. will be made, to be returned on receipt of a *bonâ-fide* tender), on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Retort-House Floor," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, March 31, 1904.
L. C. Evans,
Town Clerk.
Town Hall, Salford,
March 11, 1904.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY GENERAL ASSEMBLY of Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate Street, E.C., on Thursday, the 24th of March ensuing, at Twelve o'clock precisely, pursuant to Act of Parliament.
The TRANSFER BOOKS in respect of the ORDINARY STOCK WILL BE CLOSED from the 17th of March to the 19th of April, both days inclusive, and RE-OPENED on the 14th of April, on which day the Dividends on this Stock will be payable.
By order,
I. A. Crookenden,
Secretary.
15a, St. Helen's Place,
Bishopsgate Street, E.C.,
March 8, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. Alfred Richards' Offices, 18, Finsbury Circus, E.C.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the Directors of the above Company intend to Offer for SALE BY PUBLIC AUCTION, at the Mart, Tokenhouse Yard, in the City of London, on Monday, the 25th day of April next, at Two o'clock precisely, £12,500, being the Seventh Portion of "B" ADDITIONAL CONSOLIDATED STOCK, in the following Lots:—Fifty of £25 each, Fifty of £50 each, Fifty of £75 each and Fifty of £100 each, issued under the powers of the Tottenham and Edmonton Gas Act, 1898.
By order,
James Randall,
Secretary.
Chief Offices: 689, High Road,
Tottenham, March 11, 1904.

NOTICE by the Stirling Company (The Original Manufacturers of the Stirling Boiler). 53, Deansgate Arcade, Manchester. The Stirling Boiler Company, Limited, of Edinburgh, having ATTEMPTED to INTIMIDATE our customers by threatening them with legal proceedings for infringement, WE HEREBY INFORM PURCHASERS and USERS of our Stirling Boilers that WE WILL INDEMNIFY them against the consequences of any such legal proceedings for infringement, and, FURTHER, that we will, through our Solicitors, Messrs. Faithfull and Owen, London, DEFEND ANY SUCH ACTION.

Dated this 7th day of March, 1904.

For THE STIRLING COMPANY,
E. G. CONSTANTINE,
Manager, British Branch.

TAR Contracts Wanted on the Sliding Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

NOTICE TO CREDITORS AND CLAIMANTS.

IN THE MATTER OF THE BALLYMENA AND HARRYVILLE GASLIGHT COMPANY, LIMITED.

(IN LIQUIDATION.)

NOTICE is Hereby Given, that Special Resolutions of the above-named Company were duly passed and confirmed on the 3rd day of February, 1904, and the 20th day of February, 1904, respectively, for the voluntarily Liquidation of the Company.

All persons being creditors of, or having claims against, the said Company, are required, on or before the 21st day of March, 1904, to send their names and addresses and the Particulars of their Debts or Claims to us, as Liquidators of the said Company, at the address given below.

Dated this 20th day of February, 1904.

WILLIAM LESLIE,
SAMUEL HOOD,
JOHN WIER,
} Liquidators.

Address, 10, Wellington Place, Belfast.

SOUTHWARK AND VAUXHALL WATER COMPANY.

SALE BY TENDER OF THREE PER CENT. DEBENTURE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company to SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock (noon) on Tuesday, March 22, 1904, such amounts of the Company's Debenture Stock "B" and Intercommunication Debenture Stock as will produce £75,000 and £85,000 respectively.

The Stocks now for Sale are part of the Capital authorized by, and to be issued under the provisions of, the Southwark and Vauxhall Water Act of 1898, and the Metropolis Water Act, 1899, and will be entitled from March 31, 1904, to Interest at the rate of £3 per cent. per annum. They will be known as Debenture Stock "B" and Intercommunication Debenture Stock respectively, and may be redeemed at par at any time after the expiration of Twenty-five Years from the date of issue, subject to six months' previous notice of the intention to redeem. They will rank for interest *pari passu* with the other Debenture Stock of the Company, but before the Ordinary and Preference Stock and Share Capital.

On the transfer of the Water Companies to the Metropolitan Water Board, these Debenture Stocks will have the advantage of the additional security provided by Section 15 of the Metropolitan Water Act, 1902.

The Stock is a lawful investment for Trustees.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,
MONTAGUE WATTS,
Secretary.

Southwark Bridge Road,
London, S.E., March 11, 1904.

CASES FOR BINDING

QUARTERLY

VOLUMES OF THE "JOURNAL."

(GREEN CLOTH, GILT LETTERED).

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A Handbook relating to Coal Gas, Water Gas, Power Gas, and Acetylene.

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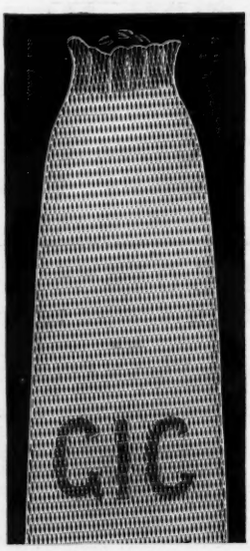

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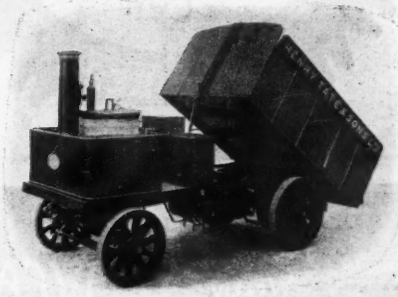

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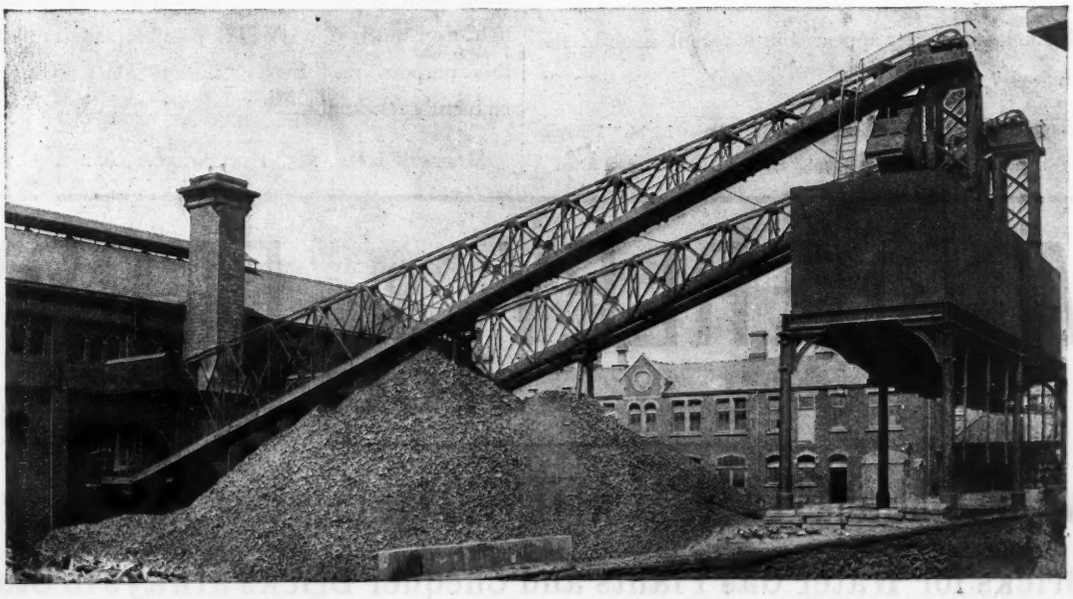

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THE LUCAS LIGHT RECORDER

Price 0d

Issued in the interests of the Gas Industry and the finest high-power Gas Lamp known

No. 32.] [*Tuesday, March 15, 1904.*

A Hint from Outside

As matters stand now, Gas Companies are perhaps as much interested in knowing how the different gas burners compare in popular estimation. We have given a good many indications of this on several occasions, but the following hint may nevertheless prove of special interest, all the more so as it has come to us in an unusually round-about way.

The following letter appeared in a recent issue of the *Grocer*:—

> Sir,
>
> In reply to your correspondent "Better Light," I may say that I had a Lucas Patent Burner (Incandescent) fitted about a month ago, and same has given complete satisfaction. I previously used ordinary Incandescent Burners, and I am so pleased with the change that I can safely recommend same to your correspondent. Mine is 200 c.p.
>
> I am, &c.,
>
> M. S. CHAMBERLAIN.
>
> 93, Blackfriars Road, Southsea.

The wisest policy for all concerned, whether it be Gas Companies or Gas-Fitters, is unquestionably to give light Consumers the greatest possible satisfaction. For this purpose the Lucas Lamp has proved itself eminently serviceable.

MOFFATS LTD., 155, FARRINGDON ROAD, E.C.

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Give SPECIAL and PERSONAL ATTENTION to the execution of all orders

Bricks for Water Gas Plants and Chequer Bricks always in Stock.

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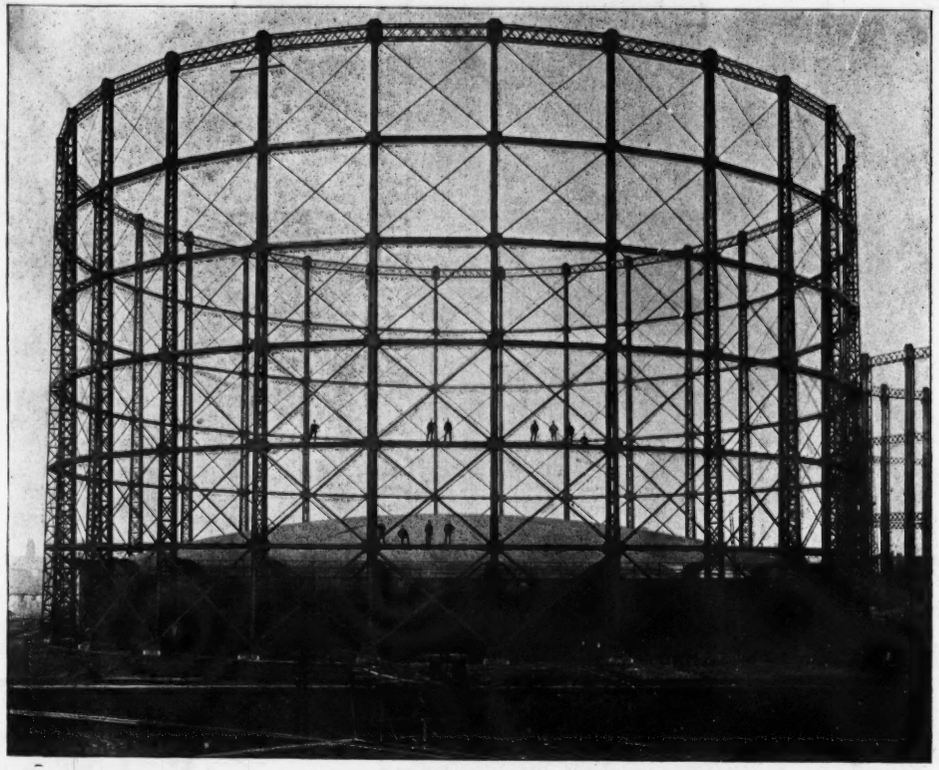

VIEW OF GUIDE FRAMING OF THREE-LIFT GASHOLDER, 250 feet by 50 feet. *(From a Photo.)*

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METHANE-HYDROGEN WATER-GAS PLANT.

3 gallons Tar and 20 lbs. Coke produce 1000 cubic feet 10 to 12 Candle Power Gas of the following composition—

Hydrogen	64·4 per cent.
Methane	12·0 „ „
Unsaturated Hydrocarbons	3·0 „ „
Carbon Monoxide	15·0 „ „
Nitrogen and Carbon Dioxide	5·6 „ „
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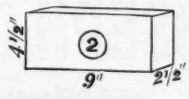
Calorific Value	400 B.T.U.

See **Prof. VIVIAN B. LEWES'S** Lecture before Society of Arts, reported in the "JOURNAL OF GAS LIGHTING," Dec. 9, 1902.



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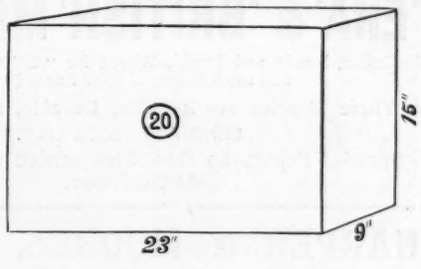

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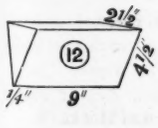

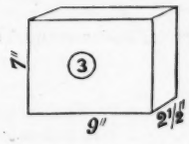

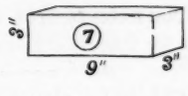

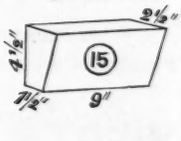

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[See Illustrated Advertisement, March 1, p. 510.]

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Have been made in large quantities for the last twenty years; and during the whole of that time have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.
Retorts carefully Packed for Export.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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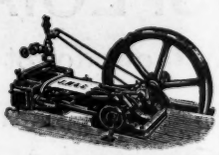

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Light, Strong, Unbreakable, and Cheap.

GAS, WATER, & STEAM TUBES AND FITTINGS.

WELDLESS STEEL SPIGOT & FAUCET PIPES for Gas and Water Mains.

Tubes can be supplied up to 10 inches diameter and in lengths up to 30 feet.

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